STRENGTHENING TEACHER EFFICACY

FOR TEACHING 21ST CENTURY SKILLS

by

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Abstract

Despite agreement among employers, educators, non-profit organizations, and the public at large about the value of teaching students 21st century skills, these non-academic competencies are not systematically integrated into student learning experiences in many U.S. public schools. This study, conducted in a small magnet middle school in the northeastern United States, aimed to strengthen teacher efficacy for teaching 21st century skills to foster a coherent, purposeful approach to preparing middle school students for college, career, and life outside the classroom.

Teachers who participated in this study engaged in five professional learning sessions on a task design framework, the 6 A's Framework, to explore how it might support them in integrating 21st century skills with academic content. Collaborating within a community of practice model, participants examined components of the framework and discussed with interdisciplinary teams how they might apply these components in their classrooms. A mixed-methods questionnaire and a quantitative teacher efficacy survey, both administered before and after professional learning, and individual interviews measured changes in teachers' knowledge and efficacy.

Study findings indicated that teacher knowledge of strategies to teach 21st century skills increased. Teacher efficacy likewise grew stronger, particularly in relation to teachers' confidence in their ability to continue learning about 21st century skills and to plan instruction integrating 21st century skills. Further, teachers reported that collaborating in a community of practice positively impacted their learning and efficacy. These findings suggested that self-efficacy drivers such as verbal persuasion and vicarious experiences can be important drivers of

teachers' efficacy for teaching 21st century skills. They also underscored the importance of collaboration in building teacher capacity for systemic change.

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Dedication

For my boys.

May your education in and out of school prepare you for a life that is endlessly joyful, uniquely purposeful, and profoundly fulfilling.

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I am grateful for the encouragement and assistance of a number of individuals who joined me on my dissertation journey. Thank you to the Johns Hopkins University faculty, education leaders and school colleagues, and family members who supported this effort.

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Contents

Abstract ii
Dedication iv
Acknowledgements v
Executive Summary 1
Chapter 1: The Problem of Preparing Students for the Future 14
21st Century Skills 16
Theoretical Framework 19
Macrosystem and Chronosystem: Cultural Beliefs about the Purpose of Schooling 21
Purpose of Middle School 23
Exosystem: Standards and Accountability Measures 25
Microsystem: Teachers and Students 27
Teacher Efficacy 28
Efficacy for Instructional Practice 30
Efficacy for Student Engagement 31
Efficacy for Classroom Management 32
Domain-Specific Efficacy 33
Students 35
Student Resistance 36
Student Self-Regulation 37
Conclusion 39
Chapter 2: Needs Assessment 41
Purpose of the Study 42
Research Questions 42
Methods and Procedure 43
Setting 44
Sample 44
Constructs 45
Research Paradigm 47
Instrumentation 47
Survey 47
Focus Group Protocol 49

Task Analysis Tool 49
Data Collection 50
Survey 50
Focus Group 50
Task Analysis 50
Trustworthiness of Study 51
Data Analysis 52
Survey 52
Focus Group Protocol 53
Task Analysis Tool 53
Results 53
Research Question #1a 54
Academic Purpose 54
Life Preparation 56
Situated Learning 57
Research Question #1b 58
Critical Thinking and Problem-Solving 59
Interpersonal Skills and Leadership 60
Self-Direction and Productivity 61
Creativity and Adaptability 62
Research Question #1c 63
Critical Thinking and Problem-Solving 64
Interpersonal Skills and Leadership 64
Self-Direction and Productivity 65
Creativity and Adaptability 66
Research Question #1d 67
General Teaching Efficacy 67
Standards and Accountability Measures 67
Education System 68
Family Influence 70
Personal Teaching Efficacy 71
Efficacy for Engagement 72

Efficacy for Instruction 73
Efficacy for Classroom Management 75
Domain-Specific Efficacy....76
Discussion....80
Conclusion 84
Chapter 3: Intervention Literature Review 86
Intervention Content: Conceptual Framework....87
Authentic Pedagogies: Instruction for 21st Century Skills 89
Integrated Learning: Curricular Content for 21st Century Skills....92
Academic Self-Regulation: Student Engagement for 21st Century Skills....94
Task Design for 21st Century Learning....96
Academic Task Design Models for 21st Century Learning 97
Content or Context Task Design Models....98
Own it, Learn it, Share it....98
TARRGET Framework....99
6 A's Framework 99
Intervention Process: Conceptual and Theoretical Frameworks 103
P21 Framework 104
Scalable and Sustainable....104
Specific Tools and Strategies....106
Content and 21st Century Skills 107
Knowledge Sharing....108
Teacher Efficacy....110
Professional Learning 113
Collaborative Models 113
P21 Framework....115
Teacher Efficacy 116
Communities of Practice 116
P21 Framework....119
Teacher Efficacy 120
Interdisciplinary Teams 120
P21 Framework....122

Teacher Efficacy 122
Appreciative Inquiry 123
Conclusion 124
Chapter 4: Intervention Methods 128
Purpose of Study 130
Research Questions 130
Research Design 131
Outcome Evaluation Design 132
Process Evaluation Design 133
Treatment Theory and Logic Model 133
Methods 136
Participants 136
Outcome Evaluation Instrumentation 138
Pre- and Post-Intervention Questionnaire 139
Pre- and Post-Intervention Efficacy Survey 139
Individual Interview 140
Collaboration Reflection Log 141
Focus Group Protocol 141
Process Evaluation Instrumentation 141
Professional Learning Session Log 142
Task Feedback Tool 142
Task Implementation Documentation Form 143
Procedure 143
Phase 1: Professional Learning Sessions 144
Session 1 145
Session 2 146
Session 3 146
Session 4 146
Session 5 147
Phase 2: Collaboration Sessions 147
Phase 3: Task Implementation 148
Data Collection 148

Outcome Evaluation....148
Process Evaluation....149
Data Analysis....149
Quantitative....150
Qualitative....151
Converging Data....152
Conclusion....152
Chapter 5: Findings and Conclusions....154
Overview of Implementation....157
Community of Practice....159
Findings....160
Teacher Knowledge....161
Quantitative Findings on Teacher Knowledge....161
Qualitative Findings on Teacher Knowledge....164
Academic Content and 21st Century Skill Integration....165
Ideas for Task Design....166
Converging Data....169
Teacher Efficacy....170
Quantitative Findings on Teacher Efficacy....170
Qualitative Findings on Teacher Efficacy....172
Strategies for Engagement and Classroom Management....173
Continued Learning and Application to Practice....174
Communities of Practice....177
Interdisciplinary Dialogue....180
Collaborative Planning....181
Converging Data....182
Conclusions and Discussion....185
Teacher Knowledge....185
Criteria for Professional Learning....185
Instructional Core for 21st Century Learning....187
Middle School as a Site for College, Career, and Life Readiness....190
Teacher Efficacy....191

Impact of Teacher Professional Experience 193
Impact of Communities of Practice 195
Recommendations for Practice 197
Implications for Future Research 200
Limitations 201
Conclusion 202
References 204
Appendix A: Teacher Needs Assessment Survey 239
Appendix B: Needs Assessment Focus Group Protocol 242
Appendix C: Task Analysis Tool 243
Appendix D: Quantitative Survey and Task Analysis Data 246
Appendix E: Treatment Theory for Intervention 248
Appendix F: Pre-/Post-Intervention Questionnaire 249
Appendix G: Collaboration Reflection Log 251
Appendix H: Teacher Efficacy Survey 252
Appendix I: Focus Group Protocol 253
Appendix J: Semi-Structured Interview Protocol 254
Appendix K: Professional Learning Session Log 255
Appendix L: Task Feedback Tool 257
Appendix M: Task Implementation Documentation Form 258
Appendix N: Outcome and Process Evaluation Data Collection Summary Matrix 259
Curriculum Vitae 261

Tables

Table 2.1 Needs Assessment Participants 45

Table 2.2 Number of Participants in Each Component of Needs Assessment 50

Table 2.3 Distribution of Tasks Submitted for Analysis 51

Table 2.4 Teachers' Perceptions of Importance: Traditional Academic Skills 59

Table 2.5 Teachers' Perceptions of Importance: Critical Thinking and Problem Solving Subskills 60

Table 2.6 Teachers' Perceptions of Importance: Social and Cross-Cultural Skills, Communication, and Leadership Subskills 61

Table 2.7 Teachers' Perceptions of Importance: Self-Direction and Productivity Subskills ..62

Table 2.8 Teachers' Perceptions of Importance: Creativity and Adaptability Subskills 63

Table 2.9 Teachers' Reported Frequency of Instruction vs. Actual Instruction: Critical Thinking and Problem Solving Subskills 64

Table 2.10 Teachers' Reported Frequency of Instruction vs. Actual Instruction: Communication, Social and Cross-Cultural Skills, and Leadership Subskills....65

Table 2.11 Teachers' Reported Frequency of Instruction vs. Actual Instruction: Self-direction and Productivity Subskills 65

Table 2.12 Teachers' Reported Frequency of Instruction vs. Actual Instruction: Creativity and Adaptability Subskills 66

Table 2.13 Teachers' Self-Reported Sense of Confidence in Teaching Subskills 76

Table 3.1 Components of the 6 A's Framework 100

Table 4.1 Research Questions, Evaluation Types, and Implementation in Amended Study 131

Table 4.2 Participants in Original and Amended Study 137

Table 4.3 Comparison of Outcome Evaluation Instruments Proposed and Implemented in Original and Amended Studies 138

Table 4.4 TSES and Interview Question Correlation 140

Table 4.5 Process Evaluation Instruments Proposed and Implemented in Original and Amended Studies 142

Table 4.6 Intervention Activities, Frequency, Constructs, and Change Mechanisms 143

Table 5.1 Components of the 6 A's Framework, Correlation to Instructional Core for 21st Century Learning, and Inclusion in Research Study 155

Table 5.2 Intervention Implementation Timeline 158

Table 5.3 Participant Contextual Information 159

Table 5.4 Teacher Knowledge of 21st Century Skill Strategies and 6 A's Framework 162

Table 5.5 Comparison of Composite Ranges and Mean Scores on Pre- and Post-Intervention Efficacy Surveys 170

Table 5.6 Quantitative Survey Selected Item Analysis 171

Figures

Figure 1.1 P21 Skills in the Learning and Innovation Domain and Life and Career Domain 18

Figure 1.2 Nested Systems of Ecological Systems Theory 20

Figure 1.3 Conceptual Framework for Needs Assessment 40

Figure 3.1 Original Instructional Core and an Instructional Core for 21st Century Learning 89

Figure 3.2 Original Conceptual Framework for Intervention Process 126

Figure 4.1 Amended Conceptual Framework 129

Figure 4.2 Logic Model 136

Figure 4.3 Professional Learning Plan Overview 144

Figure 4.4 Coding Cycles, Code Labels, and Code Descriptions for Qualitative Analysis .151

Figure 5.1 Conceptual Framework for Intervention Implementation 158

Figure 5.2 Correlations Between Instructional Core for 21st Century Learning and 6 A's Framework Components 187

Executive Summary

This study aimed to strengthen middle school teachers' efficacy for teaching 21st century skills in order to maximize student opportunities to systematically build and apply these skills through everyday learning experiences. An intervention involving professional learning on a task design framework was introduced in the context of a small magnet middle school in the northeastern U.S. Teachers explored the framework within a community of practice model that featured interdisciplinary teams and an emphasis on appreciative inquiry. This mixed-methods study investigated the outcomes of the collaborative professional learning experience on teachers' knowledge and efficacy for teaching 21st century skills.

Problem of Practice

To compete in a post-industrial economy, engage as global citizens, and thrive as self-fulfilled adults, America's youth must become proficient not only in traditional academic skills and content, but also in 21st century skills—among them, how to think creatively, work collaboratively, solve problems, and adapt to change (Partnership for 21st Century Learning, 2015; Schoen & Fusarelli, 2008). For the last three decades, stakeholders ranging from private employers to non-profit organizations have urged public schools in the United States to teach these 21st century skills to ensure students' success in college, career, and life. Despite this urging, reports have repeatedly concluded that American students remain "inadequately prepared to be successful" in the 21st century (Casner-Lotto & Barrington, 2006, p. 7).

Although secondary schools in the United States purport to embrace 21st century skills in their mission and vision statements (Bencze & di Giuseppe, 2006; Slate, Jones, Wiesman, Alexander, & Saenz, 2008), they tend to teach these skills in a superficial or fragmented manner (Bencze & di Giuseppe, 2006; Scott, 2015; Szczesiul, Nehring, & Carey, 2015). Where 21st

century skills are addressed at all, they are supplemental to "core" content or skills—and consequently, can be easily minimized, ignored, or forgotten. As a result, middle school students have few opportunities to develop, practice, and refine the skills they will need for future academic, professional, and personal success (Eng, 2012). Without systematic and cohesive efforts to help students build these competencies, America's schools may become "increasingly irrelevant" (Harvard Advanced Leadership Initiative, 2014, p. 2).

Contributing Factors

This study used Bronfenbrenner's (1977) ecological systems theory as a framework for identifying factors contributing to the problem. At the intersection of the macrosystem and the chronosystem—addressing cultural beliefs and historical changes, respectively—sits the first factor: disparate beliefs about the purpose of schools in general, and middle schools in particular. For the last century, theorists, educators, and the public at large have failed to agree on the purpose of America's public schools. A tension persists between academic and socioeconomic purposes of schooling, resulting in an emphasis on either college *or* career readiness (Lingard & McGregor, 2014; Johnson, 2000; Widdowson, Dixon, Peterson, Rubie-Davies, & Irving, 2015). Likewise, in the middle grades, there is disagreement over whether to prepare students for the next level of learning, or alternatively, to underscore social-emotional learning and personal exploration (Beane, 1993; Eichhorn, 1966; Friend & Degan, 2007; Lounsbury, 1990; Schaefer, Malu & Yoon, 2016). Such dichotomous thinking has undermined the prospect of pursuing multiple aims simultaneously: preparing students for future learning *and* life outside of school.

At the exosystem level, standards and accountability measures have also contributed to the problem. Standardized tests, and the standards they evaluate, can exert considerable influence over teachers' beliefs and practices. Where teachers are accountable for meeting accountability

mandates, they believe they must concentrate resources and effort on preparing students for state or national tests. In these contexts, teachers perceive having insufficient time to deviate from standards (Schoen & Fusarelli, 2008); they focus on basic content and skills to ensure student proficiency in tested areas (Resnick & Resnick, 1992; Schoen & Fusarelli, 2008; Szczesiul, Nehring, & Carey, 2015). This narrow focus limits opportunities to integrate other outcomes, such as 21st century skills, that lie outside prescribed standards (Loeb, Knapp, & Elfers, 2008).

Finally, two factors exist at the microsystem, or classroom, level. Teacher efficacy, or "the teacher's belief in his or her capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context" (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998, p. 233), can impact the integration of 21st century skills. Teachers with lower levels of teaching efficacy may be less likely to implement practices that support 21st century skill integration, including embracing new instructional approaches; designing student-centered tasks that promote independent, innovative thinking; engaging students in relevant, rigorous learning; and promoting student ownership, responsibility, and voice (Allinder, 1994; Ashton & Webb, 1986; Berman, McLaughlin, Bass, Pauly, & Zellman, 1977; Nie, Tan, Liau, Lau, & Chua, 2012; Woolfolk, Rosoff, & Hoy, 1990; Yeung, Craven, & Kaur, 2014). Also at the classroom level, student self-regulation (Zimmerman, 2002) can influence the degree to which students engage with 21st century learning. When students who have mastered the traditional game of school confront 21st century learning experiences, those with weak self-regulation skills may become frustrated, disengaged, or resistant (Akerlind & Trevitt, 1999; Daniels & Araposthathis, 2005; Schunk, 1990; White et al., 2012). In turn, teachers—especially those with low efficacy (Tschannen-Moran & Woolfolk Hoy, 2001)—may respond to these reactions by abandoning efforts to teach 21st century skills (Hora & Ferrare, 2012).

Needs Assessment

A needs assessment explored the impact of contributing factors from multiple ecological systems in one school to understand the limited integration of 21st century skills in this context. Nine teachers from a small magnet middle school in the northeastern United States participated in the needs assessment study. The study aimed to examine participants' beliefs about the purpose of middle-level education; their personal efficacy, general efficacy, and efficacy for teaching 21st century skills; and their current practices in relation to teaching 21st century skills.

Participants completed a mixed-methods survey with open-ended questions about their professional beliefs and practices, and three sets of parallel questions that asked them to rate the importance of, the degree to which they taught, and the degree to which they felt confident teaching specific 21st century skills. These ratings were compared with ratings from a task analysis conducted by the researcher, evaluating the degree to which the same skills were evident in student learning tasks submitted by teachers. Finally, participants took part in a focus group in which they discussed the purpose of middle school, beliefs about teaching 21st century skills, and challenges that prevented them from teaching these skills in their respective courses.

Participants believed strongly that middle-level education should not only support academic learning outcomes, but should also offer situated learning experiences to prepare students for life outside of school. They identified most 21st century skills as essential for students' future success, and thought these should be taught in middle school. Participants reported that they already taught many of these skills to a significant degree and felt confident teaching them. However, this finding was countered by task analysis ratings, which showed low integration of 21st century skills in student learning tasks. Explaining the challenges to teaching 21st century skills, teachers cited factors such as parent and public expectations about teaching

and learning outcomes, limited time due to the pressure to teach standards, poor student behavior and motivation, and insufficient opportunities for collaboration. Finally, teachers demonstrated relatively high levels of efficacy for instruction and engagement, suggesting their openness to exploring new strategies or approaches to support further integration of 21st century skills.

Intervention Frameworks and Literature

Multiple conceptual and theoretical frameworks guided a literature review to address the needs assessment findings. The researcher used the instructional core (City, Elmore, Fiarman & Teitel, 2009) as one conceptual framework informing this research. The instructional core—comprised of teacher pedagogy, content, and student engagement, all coalescing around an instructional task—was reconceptualized as an instructional core for 21st century learning. In this reconceptualized model, authentic pedagogies (Buck Institute of Education, 2018; Newmann & Wehlage, 1993; Newmann, Marks, & Gamoran, 1996), integrated content (Brazee & Capelluti, 1995; Drake, 2007), and academic self-regulation (Cooper, Horn, & Strahan, 2005; Pintrich & De Groot, 1990) coalesced around an academic task for 21st century learning.

The reconceptualized model guided a literature review on academic task design (Doyle, 1984; Klapper, 2003) to identify a task framework that would support 21st century skill integration. Although several task frameworks reflected individual elements of an instructional core for 21st century learning (Ames, 1992; Hampel, 2006; Lee & Hannafin, 2016), only one reflected all three elements of authentic pedagogies, integrated content, and academic self-regulation. The 6 A's Framework (Steinberg 1997)—consisting of six components: Authenticity, Academic Rigor, Active Exploration, Applied Learning, Adult Connections, and Assessment—was therefore selected as a focus for the intervention.

Two additional frameworks, the P21 Support Systems Framework (Partnership for 21st Century Learning, 2015) and teacher efficacy theory, also guided research and intervention design. According to the P21 Framework, professional learning on 21st century skills must (1) be scalable and sustainable, (2) offer specific tools and strategies, (3) support content and skill integration, and (4) facilitate knowledge-sharing. Teacher efficacy theory proposes that teaching efficacy is influenced by three of Bandura's (1977) self-efficacy drivers: (1) mastery experiences, or classroom success (Morris & Usher, 2011; Tschannen-Moran & Woolfolk Hoy, 2007); (2) verbal persuasion, or encouragement amd feedback from respected sources (Akhavan & Tracz, 2016; Hora & Ferrare, 2012; Tschannen-Moran & McMaster, 2009; Tschannen-Moran & Woolfolk Hoy, 2007); and (3) vicarious experiences, or the observation of other professionals who demonstrate proficiency in a task or skill (Hagen, Gutkin, Wilson, & Oats, 1998). The two frameworks intersect to support professional learning that deepens teacher knowledge of effective practices, tools, and strategies to strengthen the likelihood of mastery; allows teachers to observe or learn from the experiences of their colleagues; and provides structures for teachers to share knowledge, seek feedback, and develop mutual understandings with colleagues.

These frameworks guided a literature review on professional learning models to support teachers' learning about, and implementation of, the 6 A's Framework. Several collaborative models (DuFour & Eaker, 1998; Oddone, Hughes, & Lupton, 2019) were considered for their alignment with elements of both frameworks. A community of practice model, which prioritizes developing common purpose, sharing diverse expertise to create new knowledge, and applying learning to practice (Akerson, Cullen, & Hanson, 2009; Palinscar, Magnusson, Marano, Ford, & Brown, 1998; Wenger, McDermott, & Snyder, 2002), was selected as a professional learning model for the intervention. Organizing teachers in interdisciplinary teams within the community

of practice emerged as a strategy to further support both frameworks, allowing teachers to encounter new perspectives and experiences (Borrego & Newswander. 2008; Kodkanon, Pinit, & Murphy, 2018; Warren & Payne, 1997). Finally, appreciative inquiry (Cooperrider & Whitney, 2000) was identified as a means of promoting teachers' voice in the change process, building on strengths, and illuminating the coherence between new learning and previous work (Bunshaft, 2018; Dickerson & Steven, 2011; Kozik, Cooney, Vinciguerra, Gradel, & Black, 2009).

Research Design and Methods

A convergent parallel mixed-methods study was designed to support teachers in learning how to integrate 21st century skills into student learning tasks. The purpose of the study was to increase teachers' professional knowledge and efficacy for teaching 21st century skills. To realize substantive and sustainable instructional change, teachers must develop the pedagogical knowledge necessary to implement the change (Desimone & Stuckey, 2014). Moreover, teachers must believe that the change will improve student learning outcomes, be motivated to change their practice, and persist in implementing changes—markers of teaching efficacy (Calvert, 2016; Tschannen-Moran & Chen, 2014). It was predicted that, over time, changes in teacher knowledge and efficacy would yield changes in teacher practice, ultimately expanding students' opportunities to learn, practice, and apply 21st century skills.

Three outcome evaluation questions guided the study:

OEQ1. To what extent did professional learning on the 6A's Framework alter teachers' knowledge, if at all, of how to teach 21st century skills?

OEQ2. To what extent did teachers' professional learning on the 6A's Framework alter teachers' efficacy, if at all, for teaching 21st century skills?

OEQ3. To what extent did teachers' collaboration in a community of practice impact their teaching efficacy**?**

Intervention and Participants

A three-phase intervention was designed to support teachers in learning about and implementing the 6 A's Framework. However, the study was amended due to the COVID-19 closure in spring 2020 and only the first phase was implemented. In this phase, the researcher introduced teachers to the 6 A's Framework using an appreciative inquiry process (Copperrider & Whitney, 2000). Over five one-hour professional learning sessions, teachers collaborated within a community of practice (Wenger, McDermott, & Snyder, 2002) to explore strategies and tools associated with components of the 6 A's Framework. Dialogue occurred largely through interdisciplinary teams. Had the study proceeded according to the original intervention design, teachers would have worked with their teams in the second phase to design an original task using the framework. In the third phase, they would have implemented their tasks and shared their experiences with their respective teams and the larger community of practice.

Ten teachers volunteered to participate in the original study; however, four declined to continue participation when the amended study was announced. The six remaining teachers reflected the diversity of the school context, with teachers representing a range of experience levels (1 to 27 years), grade levels (6, 7, 8), and content areas (math, science, English-Language Arts, physical education, developmental guidance).

Data Collection and Analysis

Data were collected using three instruments. First, participants completed a researcher-created questionnaire before and after the intervention. Consisting of open-ended and closed-ended questions, the questionnaire was designed to measure changes in teachers' knowledge of

task design components and strategies to support 21st century learning. Second, participants completed a pre- and post-intervention teacher efficacy survey. The survey, comprised of 21 items adapted from the Science Teachers' Efficacy Belief Instrument (Enochs & Riggs, 1990), was designed to measure changes in efficacy for teaching 21st century skills. Finally, participants took part in semi-structured individual interviews after the intervention. Interview questions, informed partly by quantitative items from Tschannen-Moran and Woolfolk Hoy's (2001) Teacher Sense of Efficacy Scale, were designed to provide qualitative data on teachers' efficacy for teaching 21st century skills after participating in the intervention.

The researcher conducted separate analyses of quantitative and qualitative data, then converged both strands of data. Quantitative analysis for the questionnaire and efficacy survey involved descriptive statistics (Onwuegbuzie & Leech, 2006). The researcher calculated mean scores for each quantitative item on the instruments and conducted an item analysis to compare pre- and post-intervention means. On the efficacy survey, the researcher also created a composite score variable within pre- and post-intervention data, then compared the distribution of data before and after the intervention. Qualitative data were analyzed using three coding cycles, first identifying a priori codes, then using conventional content analysis to identify emergent codes, and finally identifying overall themes (Braun & Clarke, 2006; Hsieh & Shannon, 2005). These qualitative themes were compared against quantitative data findings.

Findings

Quantitative and qualitative data suggested that the intervention increased teachers' knowledge of how to integrate 21st century skills into student learning tasks. The number of teachers who reported knowing specific strategies to teach 21st century skills grew from zero to five, and teachers shared that professional learning sessions had led them to "go back to the

beginning stages of [planning] my lessons," provided "a menu of other ideas," and clarified "what did [teaching 21st century skills] look like." Data also indicated that teachers' knowledge increased the most in relation to the 6 A's Framework components of Authenticity and Adult Connections (Steinberg, 1997). Although they did not design new tasks as part of the intervention, participants described tasks they hoped to create in the future that would incorporate authentic contexts and student mentorship from professionals connected to the work of their disciplines. They demonstrated not only knowing how to use these components to integrate 21st century skills, but also wanting to pursue them further after the intervention.

Data also indicated that teachers started to reconsider their efficacy for teaching 21st century skills. Quantitative data showed teachers' post-intervention efficacy ratings coalescing around the mean, suggesting that teachers had begun reflecting on their efficacy; however, without time to apply new ideas to practice, their thinking was still in progress. This thinking-in-progress was evident in interviews. Teachers were confident the 6 A's Framework would help them engage students in learning 21st century skills, but did not have experiential evidence to support these assumptions. Moreover, several spoke of their confidence using the framework to *plan* 21st century tasks, rather than *teach* 21st century skills. This distinction may signal that some felt they had a starting point for future learning or application, but did not feel confident teaching new competencies yet. Accordingly, efficacy for teaching 21st century skills may have increased less than teachers' efficacy for continued learning on teaching 21st century skills.

Finally, data indicated that teachers believed collaboration had positively impacted their professional learning and efficacy. Participants cited opportunities to hear diverse views, share previous experiences, receive clarification, and collect new ideas as especially impactful in shaping their learning and confidence in their own practice. Although teachers did not

collaboratively design and implement original tasks, their in a community of practice and their interdisciplinary dialogue during the first phase of the intervention played a critical role in enriching their learning and supporting their efficacy for applying new learning to practice.

Conclusions

Several conclusions may be drawn based on these findings. First, components of the 6 A's Framework, correlating with elements of an instructional core for 21st century learning, can help teachers integrate 21st century skills with academic content. Using this framework in the context of middle-level education can broaden the scope of college and career readiness reforms to encompass middle school grades, as opposed to high school alone. Further, these reforms can be enacted in such a way that supports students' concurrent preparation for future learning, employment, and life—without sacrificing one outcome to another. This finding may enable schools in general, and middle schools in particular, to mediate tensions between academic and socioeconomic functions of schooling (Lingard & McGregor, 2014; Widdowson et al., 2015).

In addition, just as a stronger sense of personal teaching efficacy may support instructional practices that facilitate the integration of 21st century skills (Allinder, 1994; Ashton & Webb, 1986; Berman et al., 1977; Nie et al., 2012; Woolfolk et al., 1990; Yeung et al., 2014), this study also suggests that increasing teachers' knowledge of strategies for 21st century skill integration can support teachers' efficacy for engagement and classroom management. As teachers develop deeper confidence in their ability to apply new learning about 21st century skills to practice, they may better understand how they might use these skills to engage students, create opportunities for student ownership in the classroom, and bring relevance and meaning to standards-based academic content and skills.

Finally, this study affirmed the relevance of multiple drivers of self-efficacy (Bandura, 1977) for strengthening efficacy for teaching 21st century skills. The study illustrated that teacher efficacy may not reach its potential without opportunities to apply new learning to practice and observe the impact on students (Guskey, 2002). At the same time, the study suggested that teachers' previous experiences may support efficacy for new learning in a specific instructional domain; strength-based approaches to organizational change, such as appreciative inquiry (Cooperrider & Whiteney, 200), may help teachers feel an initial sense of efficacy for engaging in reforms that may otherwise be unfamiliar. Finally, the study affirmed the importance of vicarious experiences and verbal persuasion for building teacher efficacy. Despite having only five hours of professional learning, and having no time for mastery experiences, participants reported feeling confident about applying new strategies. Their collaboration in a community of practice and in interdisciplinary teams proved to be a powerful element of the professional learning experience that positively impacted their efficacy for teaching 21st century skills.

Implications for Future Practice and Research

The findings of this study inform several recommendations for future practice. As secondary school leaders consider how to integrate 21st century skills across academic programs, they should ensure that school reform efforts are collaborative and systemic. This will promote coherence with other initiatives and also capitalize on the strengths of diverse members of the school community (Brownell, Yeager, Rennells, & Riley, 1997; Bruce & Flynn, 2012; Jensen, Sonnemann, Roberts-Hull, & Hunter, 2016; Opfer & Pedder, 2011; Shachar & Shmuelevitz, 1997). Efforts should also build on teachers' current practice, using appreciative inquiry approaches (Cooperrider & Whitney, 2000) to foster engagement and buy-in, while also empowering teachers to take risks to move beyond their previous experience. Finally, new

professional learning introduced as part of reforms should offer examples and experiences from practitioners who have previously engaged in the work (Bryk, Gomez, Grunow, & LeMahieu, 2015); engage teachers in practicing new content and skills; and include opportunities for application, reflection, sharing, and feedback (Guskey, 2002; Tschannen-Moran & Chen, 2014). These recommendations, addressing both the content and process of school reform efforts, may significantly influence the relative success of efforts to promote 21st century learning in secondary schools.

Finally, this study offers several avenues for future research. First, it is recommended that the intervention study be implemented as originally designed. Implementing the second and third phases of the intervention will allow researchers to determine whether applying new learning to practice significantly impacts efficacy for teaching 21st century skills. Additionally, future studies should test the intervention with a larger or more diverse sample, perhaps spanning multiple schools or levels (e.g., elementary and secondary). This may increase the generalizability of findings, while also reducing threats of subject or researcher bias. Finally, this study was designed for an in-person teaching and learning context. The value and relevance of the 6 A's Framework for online tasks, and the impact of a community of practice that operates outside a shared physical space, are worthy of consideration. The degree to which this study's findings remain consistent in distance education settings may be a rich area for future study.

Chapter 1: The Problem of Preparing Students for the Future

In 1991, the Secretary's Commission on Achieving Necessary Skills (SCANS), a division of the U.S. Department of Labor, published *What Work Requires of Schools: A SCANS Report for America 2000*. Presenting data from interviews with public and private sector employers, managers, union officials, and workers, the report urged that all American youth "must develop a new set of competencies and foundation skills if they are to enjoy a productive, full, and satisfying life" (SCANS, 1991, p. i). The SCANS report proposed a framework of competencies and qualities that students would need to realize success in the new millennium. These included the abilities to collaborate; identify, organize, plan, and allocate resources; acquire, organize, and interpret information; understand, monitor, and improve complex systems; think creatively, make decisions, solve problems, reason, and practice metacognition; and demonstrate responsibility and self-management (SCANS, 1991, p. iii).

Fifteen years after the release of the SCANS report, a consortium of non-profit organizations surveyed employers to determine whether recent workforce entrants demonstrated evidence of growth in these competencies. The ensuing report, *Are They Really Ready to Work? Employers' Perspectives on the Basic Knowledge and Applied Skills of New Entrants to the 21st Century U.S. Workforce*, revealed that America's young workers were deficient in written communication, critical thinking, problem solving, collaboration, and leadership (Casner-Lotto & Barrington, 2006). These were among the skills, dubbed 21st century skills, most in demand in the rapidly evolving global economy. In this information-based economic system (Castells, 2010), professional and low-skilled workers alike need to think deeply and flexibly, approach complex problems with creativity and resourcefulness, work independently and interdependently, and demonstrate proficiency in literacy and numeracy (Casner-Lotto &

Barrington, 2006; Finegold & Notabartolo, 2010; Schoen & Fusarelli, 2008). The 2006 report concluded that due to their lack of progress in developing 21st century skills, young Americans remained "inadequately prepared to be successful" in the new millennium (Casner-Lotto & Barrington, 2006, p. 7). A symposium on 21st century learning sponsored by the Harvard Advanced Leadership Initiative added that, without intentional and systematic efforts to help students develop these competencies, America's schools "are increasingly irrelevant" (2014, p. 2).

Despite ongoing calls for secondary students in the United States to develop the competencies necessary to thrive in a globalized, post-industrial world, not all students have such opportunities (Eng, 2012; Wagner, 2012). Many secondary schools purport to embrace 21st century skills in their mission and vision statements; however, most either fail to explicitly teach these skills, or more commonly, do so in ways that are superficial or fragmented (Bencze and di Giuseppe, 2006; Harvard Advanced Leadership Institute, 2014; Scott, 2015; Szczesiul, Nehring, & Carey, 2015). This lack of integration with other learning minimizes the importance of the skills and guarantees that they are taught in contrived or limited contexts, if at all. As a result, students may have few opportunities to develop, practice, and refine the skills that may be most conducive to their future success.

This lack of integration is especially problematic in middle schools, where responsibility for college and career readiness is not well defined (Kay, 2010). Without a holistic and systematic approach to guide the integration of these competencies into everyday learning experiences, or even an agreed-upon set of competencies to choose from, teachers maintain their focus on teaching and assessing traditional academic knowledge and cognitive skills that may prepare students for high school but not the world beyond (Hsu, Wang, & Runco, 2013;

Noweski, Scheer, Buttner, et al., 2012; Saavedra & Opfer, 2012). Consequently, middle school students miss essential opportunities to begin building the proficiencies that will support lifelong success.

In this chapter, several structural and cultural factors that impede schools' emphasis on, and students' development of, 21st century skills are reviewed through an ecological systems framework. Factors such as varying perspectives on the purpose of schools in general, and middle schools in particular, which has produced curricular uncertainty and inconsistency, are also discussed. Further, standards and accountability measures, teachers' sense of efficacy, and student self-regulation are examined as factors that may inhibit teaching and learning in relation to 21st century skills at the school and classroom levels. A discussion of several 21st century skill frameworks, which, despite areas of overlap, also suggest discrepancies in the conceptualization of 21st century skills, is provided in the following section. Reconciling these differences poses a challenge to middle schools seeking to determine relevant outcomes for students.

21st Century Skills

Twenty-first century skills encompass the cognitive, inter-personal, and intra-personal competencies that will empower students to meet the diverse demands of this century (Pellegrino & Hilton, 2012). More than career readiness skills alone, 21st century skills can prepare youth to realize academic, economic, civic, and social success in the future. These skills neither replace knowledge of disciplinary content and skills (Kay, 2010) nor overlap with it (Symonds, Schwartz, & Ferguson, 2011). Rather, competencies such as critical thinking, reasoning, innovation, and creativity can support academic study in any discipline and contribute to lifelong learning (Pellegrino & Hilton, 2012). Additionally, skills such as communicating, interpreting

meaning, collaborating, and respecting difference are essential for responsible democratic engagement and global citizenship (Kirlin, 2002). Finally, problem-solving, adaptability, and self-direction are tools that all individuals, regardless of college, career, or civic aspirations, can use to become resilient and independent adults (Wurdinger & Rudolph, 2009).

Despite their name, 21st century skills are not new or unique to this century. However, though they have always been relevant for some within an industrialized economy, critical thinking, creativity, and problem solving skills are now essential for all learners, regardless of their personal history or future goals, due to rapidly evolving social and economic contexts. If 21st century skills are new at all, it is because skills not previously taught as outcomes unto themselves have entered into discussions about public schooling in the United States as new economic, social, and political contexts have emerged (Rotherham & Willingham, 2010).

Over the last two decades, international coalitions, policymakers, and non-profit education organizations have proposed frameworks to articulate 21st century skills (Binkley et al., 2012; NCREL and the Metiri Group, 2003; Pellegrino & Hilton, 2012). Though the specific competencies within each framework differ, they generally fall into one of three domains: (1) cognitive, (2) inter-personal, and (3) intra-personal (Pellegrino & Hilton, 2012). Across each framework are common skills such as critical thinking, communication, and collaboration, suggesting some agreement on the need for students to think deeply communicate and their thinking clearly as the engage with others. Other competencies, from the ability to use real-world tools, to the ability to exercise empathy, distinguish the frameworks from each other and make it difficult to produce a single, widely-held set of learning outcomes. Moreover, no frameworks offer examples of what these skills look like at various developmental levels or offer a continuum of progress to apply over a student's academic career.

The Partnership for 21st Century Learning (Partnership for 21st Century Learning, 2015) offers one such framework, the P21 Framework. Developed with input from teachers, educators, and business leaders, the P21 Framework organizes competencies into three domains: (1) learning and innovation skills; (2) life and career skills; and (3) information, media, and technology skills. Like other frameworks, P21 underscores the importance of teaching 21st century skills within the context of academic disciplines. However, unlike the other frameworks, it also emphasizes cross-disciplinary conceptual understandings, which P21 refers to as 21st century themes. Additionally, P21 outlines five levels of systems that must be aligned to support student mastery of 21st century skills: (1) standards, (2) assessment, (3) curriculum and instruction, (4) professional development, and (5) learning environments.

In this study, the operational definition of 21st century skills aligns with the P21 framework, specifically encompassing learning and innovation domain skills as well as life and career domain skills (Figure 1.1). Collectively, the skills in these domains represent a wide range of academic and non-academic competencies that are relevant and useful for most college, career, and life contexts.

Figure 1.1

P21 Skills in the Learning and Innovation Domain and Life and Career Domain

Domain	21st Century Skills	Subskills
Learning and Innovation	Creativity and innovation	• Think creatively • Work creatively with others
	Critical thinking and problem solving	• Reason effectively • Use systems thinking • Make judgments and decisions • Solve problems
	Communication and collaboration	• Communicate clearly • Collaborate with others
Life and Career	Flexibility and adaptability	• Adapt to change • Be flexible

	Initiative and self-direction	• Manage goals and time • Work independently • Be self-directed learners
	Social and cross-cultural skills	• Interact effectively with others • Work effectively in diverse teams
	Productivity and accountability	• Manage projects • Product results
	Leadership and responsibility	• Guide and lead others • Be responsible to others

(Partnership for 21st Century Learning, 2015)

This chapter examines factors that may limit the implementation of these or other 21st century skill frameworks in public schools, particularly middle schools, in the United States. The next section presents the theoretical framework—ecological systems theory—through which these factors are explored and analyzed.

Theoretical Framework

Several factors, both current and historical, ranging from broad social forces to personal beliefs, contribute to the absence of 21st century skills within the United States' middle schools. These factors are examined using an ecological systems approach. Ecological systems theory posits that individuals develop through frequent, sustained, and increasingly complex interactions within their ecological system (Bronfenbrenner, 1994). Bronfenbrenner (1977) proposed a nested ecological structure (Figure 1.2) of the environmental systems influencing development, including the educational environment. This framework allows for analysis of the dynamic relationships between and among those systems. Given these relationships, a change in one system can impact the others. These systems are:

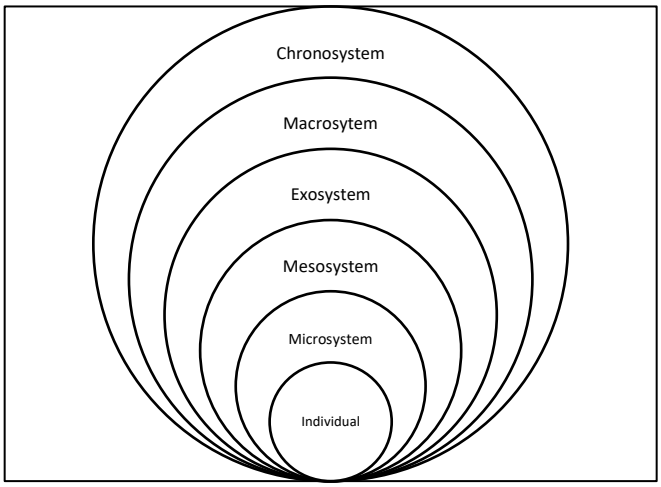
1. The macrosystem: dominant social beliefs and cultural values that characterize a social group; in an education setting, this may include beliefs about the purpose of schooling.

2. The chronosystem: historical changes within a system or the systems' development over time; in an education setting, this may include the evolution of beliefs about the purpose or nature of schooling.
3. The exosystem: formal and informal structures that influence the microsystem, but with which the individual is not directly involved; in an educational context, this may include policies related to standards and accountability systems.
4. The mesosystem: interrelations between and among multiple systems; in an educational setting, this may include home-school relationships.
5. The microsystem: an individual's immediate setting; in an educational context, this is often the classroom.

Four of these ecological structures—the chronosystem, macrosystem, exosystem, and microsystem—guide the following discussion of factors that may contribute to students' lack of opportunity to develop 21st century competencies.

Figure 1.2

Nested Systems of Ecological Systems Theory



(Bronfenbrenner, 1977)

Macrosystem and Chronosystem: Cultural Beliefs about the Purpose of Schooling

Public schools do not have a single, unified response to meet the demands of a changing world. This is true, in part, because educators, theorists, and the American public have failed to agree on three essential questions: What is the purpose of schooling? For what are schools preparing students? How should schools prepare students? (Eng, 2015). Over the last century, two philosophies have dominated public discourse on the purpose of formal schooling and the knowledge and skills necessary for success in the future. The first, highlighting the learning function of school, favors teaching content knowledge and disciplinary skills in preparation for continued academic study and lifelong learning. The second, highlighting the socioeconomic function of school, supports teaching utilitarian or future-oriented competencies and dispositions to support readiness for work, social participation, and civic engagement (Lingard & McGregor, 2014; Widdowson, Dixon, Peterson, Rubie-Davies, & Irving, 2015). These have been framed largely as either-or propositions; until recently, few have vigorously supported schools' working toward both aims for all students (Cuban, 1990).

This tension first came to the fore in the 1980s, when growing global economic competition and evidence of a widening achievement gap brought criticism of public schools' low rigor, poor student outcomes, and declining global competitiveness (Berube, 1996; Resnick, Nolan, & Resnick, 1995). Secondary schools responded with increased credit requirements, curricular standards, and high-stakes accountability measures. However, these efforts focused on college readiness and failed to integrate opportunities for students to transfer their learning from school to career and beyond (Johnson, 2000). Despite calls to recenter reforms by bridging in-school and out-of-school learning (Resnick, 1987), subsequent decades brought centralized

curricula, standards and standardized assessment tools that emphasized content knowledge, decontextualized skills, and rote memorization (Berube, 1996; Tanner, 1997).

As schools entered the new millennium, social and economic forces again levied pressure for change (Hilton, 2008). Amid the mantra of "college for all," it became apparent that traditional academic skills alone were insufficient to meet the demands of an evolving world (Symonds et al., 2011). In a 2014 survey of over 3,000 adults in the United States, 90% of respondents identified communication as an essential skill students need to succeed in the future, as 86% identified reading, 79% identified math, and 77% identified teamwork as essential skills (Goo, 2015). These findings show a turn away from schools' exclusive focus on college preparation, and toward a more balanced integration of academic and 21st century skills. A similar national survey in 2016 provided a more decisive outcome: 68% of adult respondents thought schools should focus more on career, technical, or skills-based courses than on advanced academic courses; only 21% thought academic skills were more important than real-world skills (Phi Delta Kappan, 2016). Given the national sample included in these surveys, the data can be generalized to conclude that American adults now believe that a chief purpose of public schools is preparation for diverse, complex aspects of 21st century life.

Although public perceptions about what students should learn have shifted, by most measures, students are not better prepared for economic and social changes than they were two decades ago (Carlson & McChesney, 2016; Casner-Lotto & Barrington, 2006; Finegold & Notabartolo, 2010; Radcliffe & Bos, 2013). College and career readiness standards such as the Common Core Standards have emerged to address this need. However, critics wage that these standards have institutionalized the division between preparation for work and preparation for higher education; "college readiness," they argue, is shorthand for academic skills and excludes a

range of non-academic competencies that all students will need after high school (Mattern et al., 2014). Education researchers, practitioners, and non-profit organizations have increasingly called on schools to develop a holistic approach to teaching 21st century skills with and through disciplinary content, rather than choosing one over the other (Newmann, Bryk, & Nagaoka, 2001; Lombardi, 2007; Mattern et al., 2014; Paige, 2009; Partnership for 21st Century Learning, 2015).

Purpose of Middle School

Middle-level education, generally defined in the United States as spanning grades five through eight (McEwen & Greene, 2011), occupies a unique position in debates on the purpose of schooling. An historical perspective is useful for tracing the position of middle schools. Since the middle school reform movement began in the 1960s, when schools shifted away from a junior high school model, educators have struggled to define the scope and purpose of the middle school curriculum. In an early conceptual framework of middle-level education, Eichhorn (1966) articulated the need for a new schooling model with programming to meet the unique intellectual, physical, social, and emotional needs of youth aged 10 to 14. Specifically, he proposed middle schools should balance traditional subjects with fine and practical arts, physical education, and cultural studies. For Eichhorn, the goal of these courses was not content mastery, as it was in junior high school, but exploration and personal growth. Proponents only vaguely elaborated on these ideas in subsequent years, paying more attention to organizational and structural features of the middle school than to reforms in teaching and learning (Toepfer, 1992). As the middle school model continued to develop, it remained "without a curriculum of its own" (Dickinson & Butler, 2001, p. 10).

Through the 1970s, middle schools worked to further define middle-level education; however, the focus remained on the structural and cultural features of schooling such as interdisciplinary teaming, advisories, and school climate (Beane, 1993; Lounsbury, 1990; Schaefer, Malu & Yoon, 2016). In the 1980s, seminal position papers drew attention to curricular weaknesses at the middle school level. The National Middle School Association (NMSA) published *This We Believe*, a treatise on the essential elements of the middle school, in 1982. It called for a "relevant," "challenging," "exploratory" curriculum (NMSA, 1982), but provided little guidance on what this meant or how to achieve it. Seven years later, the Carnegie Council on Adolescent Development released *Turning Points: Preparing America's Youth for the* 21st *Century*. The report detailed common failures of middle school programs and noted that schools remained unsuccessful in designing a curriculum appropriate for middle-level learners. Again, the publication advised that middle schools develop more robust curricula but did not offer a framework to guide this work (Carnegie Council on Adolescent Development, 1989).

The NMSA publicly advocated for an integrated middle school curriculum in 2002 (NMSA, 2002). Driven by students' questions and interests, this approach would empower students to explore meaningful issues and apply new knowledge to fuel further inquiry (Beane, 1990; Beane, 1996; Edwards, Kemp, & Page, 2014; Lundt, 1996). As a result, it would purposefully embed competencies such as critical thinking, collaboration, communication, innovation, and problem-solving in all aspects of student learning (Schaefer et al., 2016), aiming not only for high school preparedness but also post-secondary success. However, efforts to adopt this approach on a large scale were constrained by two concurrent forces. First, federal legislation including the No Child Left Behind Act made middle schools subject to accountability mandates and high-stakes testing (Faulkner & Cook, 2006; Musoleno & White,

2010; Vars, 2001). Second, national standards imposed specific learning outcomes for each grade, making it difficult to implement proposed practices in curriculum and instruction (Dickinson & Butler, 2001; Schaefer et al., 2016). In some middle schools, this led to a focus on designing highly rigorous academic courses (Friend & Degan, 2007). Elsewhere, practitioners and teacher educators maintained that middle schools should not be subject-centered and intellectually-driven, but should focus on developing well-rounded youth with a range of cognitive and non-cognitive skills (Aarons et al., 2014).

Caught among standards and accountability measures, tenets of developmentally appropriate learning, a growing recognition of the need for 21st century skills, and a lack of clarity on what these skills should include, middle schools continue to struggle to define their purpose and vision for a guaranteed, viable, and relevant middle-level program of studies. As a result of this confused vision, attention to 21st century learning has been incidental at best and absent at worst.

Exosystem: Standards and Accountability Measures

The concurrent emergence of standards and accountability reforms alongside the push for 21st century skills placed ostensibly competing demands on middle schools. Research has affirmed that standards and accountability measures have the potential to positively impact teachers and students by elevating instruction and ensuring quality learning for all (Gardner & Powell, 2014; Thompson, 2009). However, there is an inherent tension between meeting minimum skill proficiencies, as defined by accountability measures, and striving for the flexible and higher-order thinking embedded in 21st century skills (Schoen & Fusarelli, 2008; Szczesiul et al., 2015). While frameworks such as the Common Core Standards embed complex cognitive skills such as critical thinking (Stobaugh, 2013), these standards almost invariably exclude a

systematic focus on the inter-personal and intra-personal competencies that are part of 21st century learning (Pellegrino & Hilton, 2012).

Standards and accountability reforms bring external performance measures that may define the degree to which teachers believe 21st century skills can be integrated into learning. Assessments communicate what is valued; in the case of standardized assessments, this is often basic skills and procedural knowledge (Resnick & Resnick, 1992). This has two implications for teaching 21st century competencies. First, educators have few valid and reliable measures of student performance in relation to these skills (Binkley et al. 2012). If teachers cannot provide evidence of student learning, then it is difficult to justify committing time and other resources to this instruction. Second, and more significantly, when reforms rely on high-stakes assessments, teachers and administrators may be reluctant to deviate from traditional practices or prescribed content, fearing repercussions if students do not perform well (Schoen & Fusarelli, 2008). They may sacrifice instructional rigor and content relevance to ensure that students master the lower-level standards that appear on local or state assessments, leaving little room for 21st century skills (Szczesiul et al., 2015).

Teachers' perceptions of standards and accountability reforms can constrict instructional practice and shift focus way from 21st century skills. Despite studies that affirm the potential for a complementary relationship between standards-based instruction and higher-order thinking or real-world learning (Jennings, Swidler, & Koliba, 2005; Roberts, 2013; Seitsinger, 2005), other research shows the tension produced by these ostensibly competing aims. For example, Loeb, Knapp, and Elfers (2008) investigated teachers' perceptions of standards-based reforms in Washington state. Surveying 400 elementary, middle, and high school teachers, they found that 63% of teachers had altered their instruction to focus more on basic skills in response to the

reforms, and 73% of middle school teachers had narrowed their curricular and instructional focus to concentrate on content or skills tested on state assessments. Though the authors did not speculate on whether these changes resulted from actual or perceived pressures on teachers, they concluded that the specter of state reforms exerted sufficient leverage to constrain teachers' professional practice. In this context, the influence of standards-based reforms may provide limited opportunities to integrate 21st century skills alongside academic content standards.

Few studies have directly examined teachers' perceptions of the impact of standards and accountability measures on teaching for 21st century learning. However, as the above studies indicate, some teachers may believe that standards-based instruction and an emphasis on standardized assessments necessarily circumscribe their ability to teach any content or skills outside of local, state, or national frameworks. At the classroom level, this perception may significantly impact teachers' efficacy for implementing purposeful, systematic approaches to teaching 21st century skills.

Microsystem: Teachers and Students

The microsystem level encompasses the classroom, including teachers, students, and their interactions with each other. Within the classroom, teachers and their sense of efficacy may determine the degree to which 21st century skills are systematically integrated into student learning experiences. Teachers with stronger personal or general efficacy for teaching may be more likely to integrate these skills on a consistent basis than teachers with a weaker sense of efficacy. Likewise, students' self-regulation skills may also influence the degree to which 21st century competencies are integrated into teaching and learning. Students with stronger self-regulation ability may be better able to engage with 21st century skills, and therefore, more open

to learning experiences that integrate these skills. The following sections examine both teacher efficacy and student self-regulation.

Teacher Efficacy

The self-efficacy construct emerged from social cognitive theory, with its roots in earlier research on outcome expectancy. In an early study that would influence self-efficacy theory, Rotter (1966) found that individuals are more likely to expect a positive outcome in a situation if they believe their behavior can influence the outcome—that is, when they have internal control of a situation. In contrast, when they believe that an outcome depends on factors outside their control, individuals are less likely to expect a positive outcome. Bandura's (1977) concept of self-efficacy built upon this work. Bandura defines self-efficacy as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (1977, p. 3). This concept centers on the belief that an individual can perform an action, not that the action will produce a certain outcome. According to social cognitive theory (Bandura, 1986), self-efficacy beliefs serve as cognitive mechanisms that guide behavior through the self-regulation of motivation and persistence. Individuals with higher self-efficacy are more likely to set meaningful goals, persevere despite challenges, demonstrate resilience after failure, and attribute outcomes to themselves rather than external factors. As a result, they tend to perform at higher levels and achieve greater success than individuals with lower efficacy beliefs (Bandura, 1997).

Teacher efficacy, derived from Bandura's (1986) self-efficacy construct, is "the teacher's belief in his or her capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context" (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998, p. 233). It includes two dimensions, general teaching efficacy and personal teaching efficacy (Ashton & Webb, 1986). General teaching efficacy, derived from outcome

expectancy theory, represents the degree to which teachers believe students can learn despite external obstacles (Gibson & Dembo, 1984). Personal teaching efficacy represents the degree to which teachers believe they can influence student motivation and achievement (Tschannen-Moran & Woolfolk Hoy, 2001). Tschannen-Moran and Woolfolk Hoy (2001) identified three dimensions of personal teaching efficacy: efficacy for instruction, efficacy for student engagement, and efficacy for classroom management.

Factors contributing to personal teaching efficacy relate to three of Bandura's (1977) four sources of efficacy beliefs: mastery experiences, vicarious experiences, and verbal persuasion. Mastery experiences, or perceived successes in instructional practice or student learning, are significantly correlated with teacher efficacy in pre-service and in-service teachers (Morris & Usher, 2011; Tschannen-Moran & Woolfolk Hoy, 2007). Verbal persuasion in the form of encouragement or positive feedback from respected colleagues, coaches, supervisors, or stakeholders is also a predictor of efficacy (Akhavan & Tracz, 2016; Hora & Ferrare, 2012), though Tschannen-Moran and Woolfolk Hoy (2007) found that this was mostly true among novice teachers. For veteran teachers, verbal persuasion may be more powerful when combined with mastery experiences (Tschannen-Moran & McMaster, 2009). Research has found less association between vicarious experience and teacher efficacy, though observing effective teaching practice may predict efficacy among pre-service teachers in particular (Hagen, Gutkin, Wilson, & Oats, 1998). These factors may influence each of Tschannen-Moran and Woolfolk-Hoy's (2001) personal teaching efficacy domains, described below; in turn, these may influence teachers' decisions and behaviors in ways that support or limit opportunities to integrate 21st century skills.

Efficacy for instructional practice. Teachers with high efficacy for instruction are more likely than teachers with low efficacy for instruction to design student-centered learning activities, communicate high expectations, and implement new strategies to help students learn in ways that support 21st century skill development (Allinder, 1994; Ashton & Webb, 1986; Berman, McLaughlin, Bass, Pauly, & Zellman, 1977; Nie, Tan, Liau, Lau, & Chua, 2012). For example, in a study of 121 elementary science teachers in Midwestern United States schools, Forbes and Zint (2011) used a questionnaire to investigate teachers' "beliefs about, perceived competencies for, and reported use of" science inquiry practices to support students' learning about the environment (p. 32). The questionnaire used three sets of parallel questions to evaluate teachers' beliefs, perceived competencies, and practices: (1) *As part of my science teaching, I should support my students to…;* (2) *I have the necessary knowledge, skills, and resources to support my students to*…; and (3) *As part of my science teaching, I currently support my students to*…. (p. 33). Forbes and Zint found a correlation between teachers' efficacy beliefs and instructional practices. Teachers who reported a stronger sense of perceived competencies, or efficacy, were more likely to engage students in practices such as asking questions, making predictions, performing investigations, constructing explanations, and proposing reasonable solutions. Teachers with lower self-reported efficacy were less likely to integrate these practices, even when they believed they should.

In a smaller qualitative study that similarly focused on elementary science teachers, Haney, Lumpe, Czerniak, and Egan (2002) surveyed and interviewed six teachers to assess their instructional efficacy beliefs. Items from the researcher-created Context Beliefs About Teaching Science (CBATS) instrument were coupled with items from the STEBI, or Science Teachers' Efficacy Beliefs Instrument (Enochs & Riggs, 1990), to measure teacher efficacy; collectively,

these items were used to evaluate teachers' beliefs about factors that would support their instructional effectiveness and the likelihood that these factors would occur. The researchers also observed 10 teachers using the Horizon Protocol for effective science teaching (Horizon Research, 1998), visiting each teacher for one 45- to 60-minute lesson; six of the observations were used for data analysis. Data from each instrument were correlated to examine the relationship between efficacy and instructional practice. Teachers who reported higher efficacy beliefs were more likely to use inquiry approaches, encourage collaboration, and make real-world connections. Teachers with lower reported efficacy scored lower on the Horizon Protocol, demonstrating "little or no evidence of student thinking or engagement," "passive learning," and "activity for activity's sake" (p. 177). These outcomes suggest that higher efficacy for instruction may correlate with practices that support 21st century skills.

Efficacy for student engagement. Teacher efficacy for student engagement also has implications for 21st century skills. Teachers with high efficacy in this domain are more likely to maintain high standards for all students (Ashton & Webb, 1986; Bencze & di Giuseppe, 2006), and therefore, more likely to regard each student as capable of becoming an independent, creative thinker with the ability to engage in authentic 21st century tasks. Moreover, teachers with higher efficacy are more likely to encourage students to engage with challenging questions or problems (Ashton & Webb, 1986). In a quantitative study of 208 elementary teachers in Australia, Yeung, Craven, and Kaur (2014) used a 22-item scale to evaluate teachers in relation to five factors: (1) teacher self-concept, (2) valuing of learning, (3) conventional beliefs, (4) student-centred teaching approach, and (5) teacher-centered teaching approach. The scale was adapted from "existing psychological measures" (p. 310) which were not identified. The researchers found that teachers with a higher self-reported sense efficacy were more likely to

approach student learning challenges with the belief that ability is flexible. These teachers also were more likely to value rigorous learning for all and to seek strategies to "enable students to construct, own, and expand knowledge" (p. 314).

In contrast, in a qualitative study of 122 urban middle school teachers, Jackson, Gibbons, and Sharpe (2017) showed that teachers with low efficacy tended to respond to student learning challenges by minimizing the cognitive demand of tasks and focusing on basic skills. Researchers conducted individual semi-structured interviews with participants in two districts, asking questions that probed how teachers explained students' challenges in math, and how they responded to these challenges. Jackson et al. found that some teachers did not believe they could positively impact student learning, and as a result, implemented instructional practices that were "unlikely to enable students' development of robust, enduring understandings of mathematics" (p. 34). As teachers with low efficacy reduce expectations of student ability, allow students to give up, and accept substandard performance as evidence of learning (Dembo & Gibson, 1985), students have fewer opportunities to engage in critical thinking, creativity, and student-directed learning tasks grounded in 21st century skills.

Efficacy for classroom management. Teacher efficacy for classroom management can impact the degree to which teachers establish learning environments conducive to 21st century skills. Teachers with low perceived efficacy may seek to maintain orderly classrooms; fearing student disruptions and loss of control, they create more custodial settings (Ashton & Webb, 1986). In these contexts, teachers may be less likely to offer opportunities for students to learn and practice skills such as leadership, communication, and collaboration. According to Bonwell and Eison (1991), the "fear of failure, fear of loss of control due to enhanced classroom discussion, fear of lack of student participation, and fear of criticism of a new method" can result

in teachers' emphasis on the traditional content and strategies with which they are more comfortable. Teachers with higher efficacy for classroom management permit greater student autonomy (Woolfolk & Hoy, 1990), as well as more fluid organizational structures that foster opportunities for 21st century skills.

In a study illustrating these outcomes, Woolfolk, Rosoff, and Hoy (1990) surveyed 55 sixth and 7th grade English-language arts teachers in parochial schools to test teachers' efficacy beliefs. Each teacher responded to selected items from four survey instruments: Gibson and Dembo's (1984) Teacher Efficacy Scale, the Pupil Control Ideology assessment, the Problems in School Inventory, and the Teacher Perception of Student Motivation Inventory. Results from each instrument were correlated to explore relationships among teachers' efficacy beliefs and their attitudes toward student control. The researchers found that high efficacy ratings correlated with less custodial approaches to student control. Further, a higher custodial orientation to classroom management correlated with lower tendency to encourage student autonomy and independent problem solving. Woolfolk et al. (1990) concluded that "teachers with a greater sense of both personal efficacy and general teaching efficacy seem more trusting of students and more able to relinquish control and share responsibility for solving classroom problems" (p. 146). Given these findings, it may follow that teachers with greater teaching efficacy are more likely to establish classroom learning environments that support students' engagement with 21st century skills such as creativity, flexibility, self-direction, and responsibility.

Domain-specific efficacy. In addition to personal teaching efficacy, domain-specific efficacy, or teachers' analysis of their skills in relation to a task, may impact teachers' practice (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). Few empirical studies address teachers' efficacy for the task of teaching 21st century skills. Although there is a need for further study in

this domain, research on self-efficacy in other domains suggests that low domain-specific efficacy may make teachers less likely to attempt efforts to deeply integrate 21st century skills into daily instruction, or even cause them to actively resist such efforts. For example, Abrami, Poulsen, and Chambers (2004) sought to identify factors that result in teachers' resistance to a single instructional practice, cooperative learning. They surveyed over 1,000 Canadian elementary and secondary teachers using the researcher-created cooperative learning implementation questionnaire (CLIQ) to measure teachers' responses in three motivational categories: perceived value of the practice, expectancy of success, and perceived cost. Abrami et al. found that teachers' expectancy of success, or belief that they could be successful implementing a new practice, was the main factor that differentiated innovation implementers from resistors. Other researchers have suggested that teachers' expectancy of success may be especially low if teachers do not understand or feel proficient in the competencies themselves (Hsu, Wang, & Runco, 2013), have not had training in how to teach them (Dembo & Gibson, 1985), lack relevant curriculum and resource materials (Beetham & Sharpe, 2013; Saavedra & Opfer, 2012), or lack access to vicarious experiences such as observing colleagues teach 21st century skills (Hagen et al., 1998).

Teachers may also feel a low sense of domain-specific efficacy if they do not believe that 21st century competencies are relevant for students, do not find them consistent with the purpose of schooling, or do not believe they fall within their instructional purview (Windschitl & Sahl, 2002; Xu, 2012). While some researchers have found discrepancies between teachers' personal beliefs and pedagogical practices (Basturkmen, 2012; Brown & Zhang, 2016; Hora, 2014; Rahman, Ali, & Iqbal, 2015), others have demonstrated a strong relationship between them. Beliefs can form an "intuitive screen" (Buchanan, Burts, Bidner, White, & Charlesworth, 1998)

through which teachers filter new learning or reforms and decide how to respond. If reform assumptions or objectives do not correspond to teachers' own beliefs, teachers are less likely to support them (Levin & Wadmany, 2006). However, if reforms can complement or co-exist with individuals' beliefs and practices, teachers are more likely to make instructional changes (Veen, 1993). Windschitl and Sahl (2002) conducted a two-year ethnographic study of three middle school teachers and their responses to a new technology initiative. They found that beliefs about students' needs, "good teaching," and the role of technology in students' lives influenced teachers' decisions to integrate technology into their classes. Specifically, when teachers believed that technology could support their beliefs about students and their needs, and when the use of technology was consistent with their conceptions of good teaching, teachers more easily integrated technology into daily learning experiences.

Finally, teachers' domain-specific efficacy may decrease if they have attempted to teach 21st century skills but perceive that their attempts have failed due to students' resistance, disengagement, or poor learning outcomes. Student feedback is an important source of teacher efficacy beliefs (Hora & Ferrare, 2012). Therefore, student disengagement or resistance in response to new content, strategies, or tasks aligned with 21st century skills may negatively impact teachers' sense of efficacy for instruction, engagement, or classroom management. However, given the absence of empirical research to specifically address teachers' efficacy in the domain of teaching 21st century skills, further study is required.

Students

Even if teachers' efficacy supports efforts to integrate 21st century skills, teachers may struggle to implement this instruction in the classroom due to student resistance or

disengagement. Students' beliefs and dispositions about learning, and their own self-regulation skills, may present obstacles to teaching 21st century skills.

Student Resistance

Students have expectations, informed by previous learning experiences, about the learning process and their role in it (Johnson & Johnson, 2009). When students' experiences have been dominated by teacher-centered instructional practices, students may believe learning is a passive process characterized by compliance, low expectations, and reliance on teachers (Zimmerman, 2002). From this perspective, learning does not involve deep thinking, intellectual risk-taking, or perseverance (Daniels & Araposthathis, 2005). Such experiences and perspectives are not uncommon among students in the United States In 2012, more than half of eighth graders polled in a national survey reported that they were not challenged in school (Boser & Rosenthal, 2012). Yet, students are not necessarily disappointed by this perceived lack of rigor: in a 2011 poll, nearly two-thirds of youth aged 8 to 18 reported that they were happy with their educational experience (Nagel, 2007).

For students satisfied with the status quo, tasks that introduce 21st century skills may be unsettling. Such tasks may require flexible, creative, and reflective thinking, as well as more student-driven inquiry, collaboration, and autonomy than students normally encounter (Saavedra and Opfer, 2012; Scott, 2015). Tasks that reflect these principles are generally more rigorous than the passive activities found in teacher-centered classrooms, and they demand that students assume ownership for their learning. However, successfully engaging with such tasks may require academic, cognitive, or metacognitive aptitudes that students have not previously developed or needed in school (Pearlman, 2010; Scott, 2015).

Students in classes that incorporate 21st century skills such as collaboration, self-regulation, and problem-solving have reported feeling less successful (Nicaise, Gibney, Crane, & Crane, 2000), being less motivated (Honkimaki, Tynjala, & Valkonen, 2004), and learning less (White, Pinnegar, & Esplin, 2010). Nicaise, Gibney, and Crane (2000) conducted a qualitative study of 59 Midwestern high school students participating in a year-long authentic science experience. Students worked with aerospace industry mentors to explore real-world issues, design independent projects, and participate in simulations. Over nine months, the researchers conducted 26 classroom observations, 20 interviews, and a document analysis to understand the learning experience from students' perspective. At the end of the year, a qualitative survey uncovered considerable dissatisfaction among students; nearly one in three reported feeling unsuccessful. According to the researchers, students who struggled believed the role of the teacher should be that of "knowledge disseminator" (p. 93). These students were uncomfortable with the demands of self-directed learning and desired more teacher guidance or instruction. Asked to set goals, implement plans, and assess progress independently, some exhibited weak effort or reported feeling unsuccessful. For those used to passive, or teacher-directed, learning experiences, the move to active, student-centered learning is unsettling. When students must interpret ideas and create meaning for themselves (von Glaserfeld, 2005), they may believe that tasks ask more than they can produce, and as a result, exhibit reduced effort or task avoidance (Bruning, Schraw, & Norby, 2011). Resistance to efforts to teach 21st century skills deprives students of any benefit and may make teachers reluctant to pursue a more comprehensive approach.

Student Self-Regulation

Students' negative reactions to new learning challenges may stem not only from a lack of opportunity to practice complex skills, but also from an undeveloped capacity for self-regulation (Szczesiul et al., 2015). Behaviors indicative of self-regulation include: (1) setting goals, (2) planning and adopting effective strategies to reach goals, (3) self-assessing progress and strategies, (4) efficiently managing time, (5) restructuring physical and social contexts to support goal attainment, and (6) reflecting on outcomes (Zimmerman, 2002). In a school setting, these behaviors can help students attend to a difficult task, persist despite obstacles, and adapt in changing or unfavorable conditions (Bandura, 2006). Students without academic self-regulation skills are more likely to feel anxious or overwhelmed when confronting challenging academic tasks; as a result, they may demonstrate low motivation, exert minimal effort, avoid tasks, or disengage from learning all together (Akerlind & Trevitt, 1999; Daniels & Araposthathis, 2005; Schunk, 1990).

Self-regulation may play a critical role in determining how students respond to tasks that integrate 21st century skills. For example, White et al. (2014) conducted semi-structured focus groups with 15 medical school students who had participated in courses reflecting a new curricular approach. This approach, distinct from that of students' previous medical school courses, emphasized adult learning principles and required 21st century skills such as effective communication and collaboration. Students in these courses generally had poorer attendance and disliked collaborative tasks, and some refused to complete most or all activities involving non-academic skills. The authors concluded that these students were "not developmentally prepared for these educational approaches" (p. 317). Students' underdeveloped self-regulation capacity can lead to disengagement from, and resistance to, learning that is perceived as different from previous learning experiences. This disengagement or resistance may discourage teachers from

introducing or persisting in teaching 21st century skills, particularly when teachers encounter perceived pressures to teach to standards and accountability measures instead. In such cases, emphasizing the latter over the former may seem the path of least resistance.

Conclusion

A changing social and economic landscape over the last two decades, and the likelihood that such changes will continue if not accelerate in decades ahead, has underscored a need to change the focus of public schools. Whereas students could once succeed with basic knowledge of core subjects, they must now excel in competencies such as critical and creative thinking, communication through diverse forms of media, and collaboration with a variety of partners in order to thrive in an information society. Factors contributing to American students' lack of opportunities to learn 21st century skills, and as a result, their unpreparedness to meet the demands of the 21st century, were identified. These include a lack of agreement as to the purpose and outcomes of schooling, pressures to meet standards that emphasize academic outcomes, low teacher efficacy, and weak student self-regulation skills. The literature indicates challenges in teachers' understanding of the purpose of middle-level education, perceptions of the impact of standards and accountability measures, access to quality professional development, teacher self-efficacy, and student self-regulation.

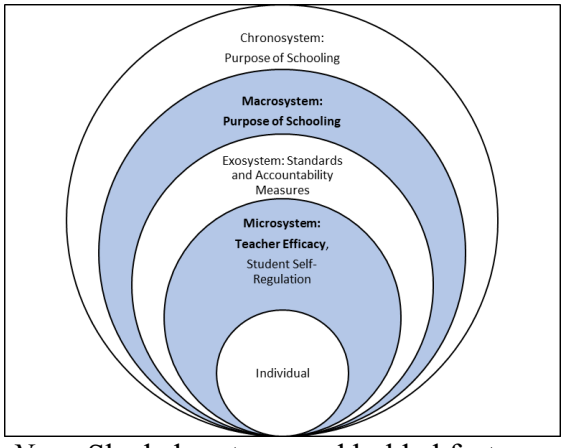
Few studies have examined on middle school teachers' beliefs about teaching 21st century skills in middle schools or their efficacy for teaching these skills. Further research is necessary to examine whether and to what degree these factors influence teachers' practice in relation to teaching 21st century skills. The next chapter details a needs assessment that was conducted in the context of a small magnet middle school in the northeastern United States The needs assessment closely examined macrosystem and microsystem factors contributing to the

problem detailed in this chapter (Figure 1.3). Specifically, the needs assessment sought to determine teachers' beliefs about the purpose of teaching and learning in middle school, and to evaluate teachers' sense of personal, general, and domain-specific teaching efficacy.

Drawing on Forbes and Zint's (2011) distinction among teachers' "beliefs about, perceived competencies for, and reported use of" instructional strategies, the needs assessment included qualitative and quantitative survey items as well as a document analysis (Nicaise, Gibney, & Crane, 2000) to collect data on teachers' self-reported beliefs about teaching 21st century skills, ability to teach 21st century skills, and practice teaching 21st century skills. It also utilized a semi-structured focus group protocol to more deeply understand teachers' perceptions of the purpose of middle school, 21st century skills, and their own instruction (Haney et al., 2002; Jackson et al., 2017; White et al., 2014). Data from the needs assessment were used to identify and clarify challenges to teaching 21st century skills in the research setting. In turn, conclusions from this needs assessment informed an intervention to support a systematic approach to integrating 21st century skills into student learning—and in turn, to preparing students for life beyond middle school.

Figure 1.3

Conceptual Framework for Needs Assessment



Note. Shaded systems and bolded factors are examined in the needs assessment.

Chapter 2: Needs Assessment

To compete in a post-industrial economy, engage as global citizens, and thrive as self-fulfilled adults, America's youth must learn to think deeply and flexibly; solve undefined problems; practice self-direction and resilience; and work in diverse, interdependent teams (Casner Lotto & Barrington, 2006; Finegold & Notabartolo, 2010; Schoen & Fusarelli, 2008). Although secondary schools in the United States purport to embrace these 21st century competencies in their mission and vision statements (Bencze & di Giuseppe, 2006; Slate, Jones, Wiesman, Alexander, & Saenz, 2008), they tend to teach real-world skills in a superficial or fragmented manner (Bencze & di Giuseppe, 2006; Scott, 2015; Szczesiul, Nehring, & Carey, 2015). This trend is especially common in middle schools, where educators receive little guidance on their role in supporting college and career readiness (Kay, 2010). Without a holistic and systematic approach to support the integration of 21st century competencies into everyday learning experiences, middle school teachers maintain a focus on traditional academic knowledge and skills (Hsu, Wang, & Runco, 2013; Noweski, Scheer, Buttner, et al., 2012; Saavedra & Opfer, 2012). As a result, middle school students have few opportunities to develop, practice, and refine the competencies they will need for future personal and professional success (Casner-Lotto & Barrington, 2006; Eng, 2012; Harvard Advanced Leadership Initiative, 2014).

A needs assessment was conducted to investigate this problem in the context of a small magnet middle school. In this descriptive needs assessment, the degree to which teachers currently integrate 21st century competencies into everyday learning experiences, as well as the factors that may limit such integration in this context, are investigated. Data from the study will inform an intervention to help teachers at the Culture and Communications Academy (CCA), a pseudonym, to fulfill the school's mission of preparing students for life in the 21st century.

Purpose of the Study

The purpose of this needs assessment was to understand and identify the factors that may be preventing CCA teachers from integrating and teaching 21st century skills in students' daily learning experiences. Specifically, the study aimed to clarify teachers': (1) perspectives on middle-level education and role as middle-level educators; (2) perceptions of 21st century skills and their relevance for students; (3) self-efficacy, including personal, general, and domain-specific teaching efficacy; and (4) current practices of integrating 21st century skills into learning tasks. An inductive analysis of mixed methods data sources explored the relationship between teacher efficacy and the integration of 21st century skills within this context. The needs assessment also utilized a task analysis tool to describe teachers' current instructional practices.

Evidence from the study distinguished professional needs, service gaps, and systemic constraints that limited CCA teachers' integration of 21st century skills into student learning tasks. Challenges emerging from this research were evaluated as potential areas of focus for intervention. Likewise, these data were used to ensure that the proposed intervention recognized and built upon effective practices already in place. Collectively, needs assessment data informed relevant, targeted professional supports to maximize student learning in 21st century competencies. To meet these objectives, the study addressed one major research question and four additional subquestions.

Research Questions

This needs assessment focused on the microsystem, exosystem, and macrosystem levels (Bronfenbrenner, 1994) to identify factors that limited the integration of 21st century skills into learning tasks at CCA. One descriptive research question framed the exploratory needs

assessment, and four subquestions guided specific aspects of the study. The primary research question was:

(RQ1) What factors limit the integration of 21st century skills into middle school learning tasks?

The subquestions were:

(RQ1a) What do CCA teachers perceive the purpose of middle-level education is?

(RQ1b) What competencies do CCA teachers think students need to be successful outside of school?

(RQ1c) Which 21st century skills do teachers at CCA think they currently teach? How are these skills these actually integrated into learning tasks?

(RQ1d) In which domains of teaching efficacy (personal, general, domain-specific) do CCA teachers rate themselves strongest and weakest?

An examination of each subquestion provided descriptive data to facilitate a deeper understanding of the problem and the factors contributing to the problem within the research context (Onwuegbuzie & Leech, 2006). In turn, data from each subquestion supported a descriptive response to the primary research question.

Methods and Procedure

The following section provides an overview of the needs assessment's methods and procedures. It describes the research setting, sample, recruitment process, constructs, instrumentation, and data collection procedure that frame the needs assessment. The section concludes with discussion of the standards of rigor and quality guiding the design of the study.

Setting

This needs assessment examined the integration of 21st century skills in a small magnet middle school, the Culture and Communications Academy (CCA), in the northeastern United States. CCA serves 150 students in grades six to eight. It draws half its population from one urban community and half from 11 surrounding suburbs. Students are racially and ethnically diverse: 42% are Latino, 30% are white, 11% are black, and 15% are multiracial. Additionally, 70% of students qualify for free or reduced-price meals via the National School Lunch Program. According to its mission statement, revised in Spring 2018, CCA strives to help its students "maximize their individual potential as they continue toward becoming lifelong learners with the competencies to thrive in the 21st century."

Sample

Nine of 12 certified teachers at CCA, a nonprobability convenience sample (Pettus-Davis, Grady, Cuddeback, & Schevett, 2011), volunteered to take part in the needs assessment; one teacher submitted tasks for the task analysis but left the study before completing the survey or focus group components. At the time of the study, participants had a mean of 10 years of professional teaching experience, with a range of one to 27 years. Collectively, they represented three grade levels and seven content areas: math, science, language arts, social studies, visual arts, music, and physical education (Table 2.1). The diversity within this sample reflected the characteristics of CCA's teacher population; therefore, findings from the needs assessment may be generalized across the school. However, due to the limited size and scope of the sample, it is difficult to generalize findings outside of this setting (Lochmiller & Lester, 2017).

Table 2.1

Needs Assessment Participants

Participant	Grade(s) Taught	Content Area
A	7, 8	Math
B	7	English-Language Arts
C	6, 7, 8	Spanish
D	6, 7, 8	Music
E	6, 7, 8	Visual Arts
F	6, 7, 8	Physical Education
G	6	Math, English-Language Arts
H	6	Social Studies, Science
I	7, 8	Science

Due to CCA's small population of teachers, as well as the value of diverse perspectives to inform an intervention (Bryk, Gomez, Grunow, & LeMahieu, 2015), all certified teachers received verbal and e-mail invitations to join the needs assessment study. The researcher's position as the teachers' supervisor and evaluator introduced potential threats of coercion or undue influence on participants (Lochmiller & Lester, 2017). To mitigate such threats, verbal and electronic invitations underscored that participation in the study was optional and those who declined to participate or withdraw early would incur no negative consequences.

Constructs

Three instruments were used to collect data on: (1) teachers' perceptions of middle-level education and role as middle-level educators; (2) teachers' perceptions of 21st century skills and their relevance for students; (3) teachers' personal, general, and domain-specific teaching efficacy; and (4) teachers' current practices for integrating 21st century skills into learning tasks. Operational definitions for key constructs are as follows:

1. *Perceptions of middle-level education* includes perceptions of schooling designed to meet the developmental needs of young adolescents in grades six to eight through appropriately challenging and personally relevant programming and responsive organizational structures (Clark & Clark, 1994).
2. *Personal teaching efficacy* considers a teacher's sense of confidence in his or her own instructional practices, student engagement practices, and classroom management practices (Tschannen-Moran & Woolfolk-Hoy, 2001).
3. *General teaching efficacy* considers a teacher's belief that teachers can improve student learning despite external obstacles and structural challenges (Gibson & Dembo, 1984).
4. *Domain-specific efficacy* considers a teacher's analysis of his or her own instructional abilities in relation to the task of teaching 21st century skills (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998).
5. A *task* includes an assignment that results in or demonstrates student learning; it encompasses three dimensions: (1) the product that students create, (2) the processes students use to create the product, and (3) the resources available to support students as they create this product (Doyle, 1983).
6. *21st century skills* include cognitive and noncognitive competencies that may help students achieve academic, professional, civic, and personal success as adults; specifically, these include learning skills and life and career skills within the P21 Skills Framework (Partnership for 21st Century Learning, 2015).

Research Paradigm

This needs assessment adopted a qualitative dominant mixed methods design. The decision to emphasize a qualitative approach was made based on three factors. First, a small sample can undermine validity in quantitative studies (Lochmiller & Lester, 2017); as such, a qualitative approach was deemed more appropriate given the research context. Second, qualitative methods empower participants to communicate in their own words, allowing researchers to gain deeper insights into their beliefs and perceptions (Maxwell, 2013). Therefore, a qualitative approach could provide a richer understanding of the problem from teachers' perspective, potentially contributing to a stronger intervention to address this problem (Bryk et al., 2015). Finally, scholars have identified a need for more qualitative research on teacher efficacy (Klassen, Tze, Betts & Gordon, 2011). Consequently, the data collected in the present needs assessment could help fill qualitative data gaps in the extant literature. At the same time, triangulating qualitative data with quantitative data may help to clarify results and expand conclusions beyond what might be possible with qualitative data alone (Lochmiller & Lester, 2017).

Instrumentation

The needs assessment measured key constructs using several instruments. Qualitative data sources included a focus group and open-ended survey questions. Limited quantitative data were also collected through survey questions and a task analysis tool. Each instrument is further detailed below.

Survey

An electronic mixed methods survey collected data on several constructs, including multiple dimensions of teacher efficacy and 21st century skills (Appendix A). The instrument's

qualitative questions permitted teachers to respond with as much or as little detail as they preferred. These questions encouraged teachers to communicate their thinking in their own words and created the opportunity to gain deeper insights into complex issues, professional values, and individual experiences (Maxwell, 2013). For example, the first four open-ended questions probed teachers' beliefs about the purpose of middle-level education.

Additionally, 11 open-ended questions addressed three dimensions of personal teaching efficacy: efficacy for instructional strategies, efficacy for student engagement, and efficacy for classroom management. The majority of previous teacher efficacy research has used quantitative measures (Klassen, Tze & Betts & Gordon, 2011). Therefore, this survey drew on and reframed items from three quantitative instruments: (1) the Teacher Efficacy Scale (Gibson & Dembo, 1984), (2) Woolfolk and Hoy's (1990) adapted version of the Teacher Efficacy Scale, and (3) the Teachers' Sense of Efficacy Scale (Tschannen-Moran & Woolfolk Hoy, 2001). It also used questions from Ashton and Webb's (1986) qualitative middle school teacher efficacy interview protocol. The survey also addressed personal and general teaching efficacy with a two-part, open-ended question adapted from Ashton and Webb's (1986) interview protocol.

Finally, the survey listed 10 traditional skills (e.g., taking notes, following directions) and 19 competencies from the P21 Skills Framework (e.g., collaboration, self-direction) and asked teachers to rate the degree to which they: (1) believe students need each skill to be successful in the future, (2) think they should teach each skill, and (3) feel or would feel confident teaching each skill. The rating scale included the following choices: *not at all, to a minimal degree, to a moderate degree, to a great degree*.

Focus Group Protocol

A focus group protocol (Appendix B) extended the survey's measure of domain-specific efficacy. Focus groups provide a structure and process to explore beliefs among members of a community with a mutual interest in a topic of research (Morgan & Spanish, 1984). Therefore, this component of the needs assessment aimed to identify and understand shared and divergent beliefs within CCA's teacher community. Ten questions and subquestions guided discussion, asking teachers to define student success, identify critical learning competencies, and describe obstacles to teaching the competencies teachers identified as critical.

Task Analysis Tool

Academic tasks reflect teacher instruction and predict student performance (Blumenfeld, Mergendoller, & Swarthout, 1987; City, Elmore, Fiarman, & Teitel, 2009; Furstenberg, 1997; Hampel, 2006). Therefore, the needs assessment included a task analysis to collect evidence of current teaching and learning experiences at CCA. The task analysis instrument (Appendix C) aligned with the P21 Skills Framework (Partnership for 21st Century Learning, 2015) and measured the degree to which tasks created opportunities for students to develop, practice, or apply specific 21st century skills and subskills. Participants rated each subskill using a 1 to 4-scale with higher scale numbers indicating the task creates stronger opportunities for students to develop, practice, or apply a skill, and therefore, more deeply integrates the competency into the learning experience. Scale descriptors ranged from (1) *No opportunity to develop/practice/apply skill. Skill does not support task completion* to (4) *Opportunity develop/practice/apply skill is explicit. Skill is essential for task completion, highly integrated, and overtly addressed in the task.*

Data Collection

Data collection occurred over a two-week period in May 2018. During this time, teachers who volunteered to participate in the study received an electronic link to the survey. Six of nine participants completed the survey, a return rate of 67%. Eight of the original nine volunteers participated in the focus group discussion, and six teachers submitted classroom tasks for the task analysis (Table 2.2).

Table 2.2

Number of Participants in Each Component of Needs Assessment

Study Component	Number of Participants
Survey	6
Task Analysis	6
Focus Group	8

Survey

Participants completed the survey within a one-week period designated by the researcher. Survey completion took approximately 45 minutes. Each participant accessed the anonymous survey on his or her laptop through Qualtrics, a digital research platform.

Focus Group

One week after completing the survey, teachers participated in a focus group discussion. The focus group occurred at CCA during a regularly scheduled 90-minute staff collaboration period. The researcher facilitated the discussion by posing preidentified questions and prompting participants with clarifying or probing questions as appropriate. The researcher recorded and transcribed the discussion.

Task Analysis

Teachers submitted one to three academic tasks they had used with their respective students during a one-week period designated by the researcher. Of 11 tasks submitted (Table 2.3), five came from math courses, three from language arts, and one each from science, social studies, and Spanish. Six tasks came from sixth grade courses, four from seventh grade, and one from eighth grade. Individual tasks varied in scope, with time requirements ranging from less than one class period to five class periods.

Table 2.3

Distribution of Tasks Submitted for Analysis

Grade	Math	Science	Language Arts	Social Studies	Spanish
6	4 tasks		1 task	1 task	
7		1 task	2 tasks		1 task
8	1 task				

Trustworthiness of Study

Traditional quantitative research standards of reliability and validity do not accurately assess the rigor and quality of a qualitative study; rather, four components of trustworthiness—credibility, transferability, dependability, and confirmability—more accurately define qualitative rigor and quality (Krefting, 1991). Each component is discussed below.

Credibility

This study demonstrated credibility by using multiple instruments and methods to triangulate data. Moreover, the researcher's role in the CCA community reflected prolonged engagement and her awareness of personal biases and positionality in that community suggest reflexive analysis to support credibility (Krefting, 1991)

Transferability

This study demonstrated transferability as the researcher described the research context and participants to support comparative analysis. Additionally, quantitative data from the task analysis provided contextual details, supporting further comparisons where appropriate (Krefting, 1991).

Dependability

This study demonstrated dependability as data collection and analysis methods were described and triangulation was facilitated with multiple instruments. A code-recode process further supported the dependability of focus group data analysis (Krefting, 1991).

Confirmability

This study demonstrated confirmability as data was drawn from multiple instruments, existing literature was used to guide and justify methods, and the researcher's awareness of personal bias and positionality was acknowledged (Krefting, 1991).

Data Analysis

Given the mixed methods design of this study, qualitative methods were applied to qualitative instruments or questions, and quantitative methods were applied to quantitative instruments or questions. Data were analyzed separately first, then converged for further analysis. An overview of methods is provided below.

Survey

At the conclusion of the one-week survey window, the researcher used an inductive inquiry approach to code qualitative responses and identify themes regarding beliefs about the purpose of middle school and teachers' sense of personal, general, and domain-specific teaching efficacy. Descriptive and in vivo codes identified themes emerging from teachers' responses and

were organized based on thematic patterns (Saldana, 2016). Additionally, the researcher converted domain-specific efficacy rating scale responses to a numeric scale (e.g., 1=*not at all*; 2=*to a minimal degree*) to calculate schoolwide averages for each question. Mean scores indicated the relative degree to which CCA teachers collectively valued, taught, and felt confident teaching traditional and 21st century subskills. Higher averages indicated that teachers valued, taught, or felt confident teaching a subskill to a greater degree.

Focus Group

The researcher used an inductive inquiry approach to review and analyze discussion data. The coding process involved identifying descriptive and in vivo codes and then organizing these into categories and themes. Reviewing and recoding the transcript data two weeks later strengthened the dependability of using two iterations of coding (Krefting, 1991; Saldana, 2016).

Task Analysis

The researcher reviewed each task's product, process, and resources to assess whether the task aligned with indicators on the task analysis tool. If there was no alignment with a subskill's indicators, the task received a rating of 1 for that subskill. A task that demonstrated evidence of alignment with indicators received a rating of 2, 3, or 4, with higher numbers indicating a subskill's deeper integration into the task. After assessing each task, the researcher calculated a schoolwide average for each subskill. Higher average scores indicated deeper integration of a subskill into student learning at CCA.

Results

The primary research question (RQ1) for this needs assessment focused on identifying factors potentially limiting the integration of 21st century skills into middle school learning tasks within the research context. Overall, results showed that teachers at CCA shared similar beliefs

about the multidimensional purpose of middle level education and the real-world competencies students must develop to be successful in the future. Further, they possessed relatively strong personal teaching efficacy for instruction and engagement. However, 21st century skills were not extensively integrated into teaching and learning experiences. This may be explained by the finding that, despite comparatively high levels of personal teaching efficacy for instruction and engagement, teachers had a weaker sense of personal teaching efficacy for classroom management, general teaching efficacy, and domain-specific efficacy.

This section is organized in relation to research subquestions. Findings pertaining to each subquestion collectively support an answer to the broader research question, which is examined in the discussion that follows.

(RQ1a) What do CCA teachers perceive the purpose of middle-level education is?

Teachers identified several purposes of middle-level education in their qualitative survey responses. These included three themes: (1) academic purpose, (2) life preparation, and (3) situated learning. Each of these themes is discussed below.

Academic Purpose

Most qualitative survey and focus group responses described an academic purpose as central to the purpose of middle-level education, citing disciplinary content and complex thinking skills—particularly in relation to literacy and numeracy—as key areas of focus. For example, one teacher stated that middle school should "provid[e] the chance to practice skills in all subjects….but focus on writing and reading," and another indicated that middle-level education should "teach [and] expect critical and creative thinking skills, increasing the complexity of literacy and mathematical learning." These outcomes underlie state and national

learning standards in most content areas, and as such, have been a focus of teachers' previous professional learning at CCA.

Beyond teaching content and skills in isolation, however, teachers noted a need to help students perceive the purpose of their learning. One teacher explained in the focus group, "These kids are asking, 'Why?' and they mean it. My vision is that more and more of what we do answers that question, 'Why?'" Many of the teacher's colleagues agreed with him in the focus group setting, adding that understanding the purpose of learning could support student engagement and motivation. Collectively, CCA's teachers believed that the middle grades must teach disciplinary content and skills, as outlined in their content standards, but also provide a broader context to underscore the purpose of this learning.

Further, several participants suggested teachers should introduce a broader context to help middle grades students begin to think across traditional disciplinary boundaries. In the focus group, a teacher of social studies and science classes discussed her efforts to help students see connections between and among academic subjects:

> I can't say enough how many times in my classes I'm like, 'Yea, you're in social studies but we're doing literacy work or we're doing math work.' Or in science, 'We're doing math work. Get out of your brains that this is just science and you're only doing science because I can't do science without math and I can't do anything else without another skill.'

Like several of her colleagues, the teacher suggested that interdisciplinary understanding could help students make greater meaning and purpose of academic learning. Another teacher added that although content-specific standards provided the direction or focus for learning, it was the teachers' responsibility to facilitate cross-curricular connections that allow "learning [to] extend

far beyond course content alone." Such connections could potentially help students to see the purpose of their learning and more easily "answe[r] that question, 'Why?'"

Life Preparation

CCA's teachers believed that, in addition to helping students understand the purpose and connections among academic content, middle schools should "prepar[e] [students] to assume the role of an adult." Teachers' survey responses identified learning habits such as metacognition and self-regulation, "how to overcome challenges, push themselves as learners," and "growth-oriented skills and mindsets" as critical skills that would help students "[learn] to stretch beyond their comfort zone." Likewise, every teacher who completed the survey listed perseverance or resilience as essential skills to teach in middle school, and four of six emphasized themes such as "cooperation [and] teamwork." Other competencies cited in multiple qualitative survey answers included communicating, demonstrating creativity, and understanding diverse perspectives. Despite not accessing the P21 Framework definitions (Partnership for 21st Century Learning, 2015), teachers had identified teaching 21st century skills among the essential purposes of middle-level education.

Teachers further believed that middle-level education should support a whole-child focus that offered opportunities for students to explore themselves and the world around them. In survey responses, teachers commented that middle-level education is distinct from other levels of schooling because it is a time for students to "think beyond themselves," to "see where they are in the world," and to "consider their contributions to a life outside their existing familial and social circle." They cited the development of characteristics such as empathy, compassion, and kindness as necessary for this growth: "to be more tolerant, to respect differences, to be patien[t]," one teacher wrote on the survey. Although not explicitly identified in most 21st

century learning frameworks, these personal skills, qualities, and values can support 21st century skills such as communication, collaboration, and interacting effectively with others. For CCA's teachers, there was a life preparation dimension to middle-level education that could not be captured in academic standards alone.

Situated Learning

Finally, teachers believed that middle schools should set learning in real-world contexts and address authentic problems to help students grasp their role as agents of change. "[I]t's how they can become positive, successful leaders in the real-world," one teacher wrote on the survey. This theme emerged in an exchange among three content area teachers during the focus group:

> Teacher 1: [Tasks should] hav[e] an authentic audience and hav[e] some sort of real-world connection.…[We should promote] problem-solving…through an actual problem that they're working through and they're finding to solution to.
>
> Teacher 2: So that they understand, they can relate to, that they can see.
>
> Teacher 1: It's not a made-up thing. Like you're actually solving [a problem].
>
> Teacher 2: Ideally [a problem] that they develop. Because it's something they have choice in, they have say in and they want to do or they have an interest.
>
> Teacher 3: Well, it allows them to take charge of their own learning and then kind of steer it in their own direction to see what needs to be done.

In this conversation, teachers demonstrated their belief that middle-level education must empower students to identify and address problems that arise in everyday life, while also enabling them to choose what problems to solve. Their vision of effective teaching in the middle grades speaks to an instructional approach that embeds the themes discussed earlier—academic

purpose and life preparation—in a situated learning context to support students' learning for a complex world outside of school and provide deeper ownership for the learning process. The next section further details the competencies teachers believed students would need in order to be successful outside of school.

(RQ1b) What competencies do CCA teachers think students need be successful outside of school?

Despite emphasizing academic themes as one of the main purposes of middle-level education, teachers defined *student success* primarily in non-academic terms. On qualitative survey items and during the focus group, they described the concept as a point in which an individual could have choices and feel independent, fulfilled, and in control of one's life. "They should learn how to define success not just on finances. There is always more to learn, which could be inspiring, not daunting," one teacher wrote in the survey. Quantitative survey items asked teachers to evaluate competencies, including traditional academic skills as well as skills aligned to the Partnership for 21st Century Learning's framework (2015), to determine which were most critical for supporting middle school students in realizing success.

On the quantitative portion of the survey, teachers considered most traditional academic skills moderately important (Appendix D). Among these skills, *follow directions* received the highest mean score (3.83 of 4.0 points), followed by *perform basic math operations* (mean=3.67), *study effectively* (mean=3.67), and *organize paper materials* (mean=3.6), as illustrated in Table 2.4 below. The only skill with an average rating below 3.0 was *memorize concepts*, with an average rating of 2.33. Notwithstanding these scores, teachers rated most 21st century skills even higher (Appendix D). These skills are discussed within four categories below:

critical thinking and problem solving; interpersonal skills and leadership; self-direction and productivity; and creativity and adaptability.

Table 2.4

Teachers' Perceptions of Importance: Traditional Academic Skills

Skill	Mean score (maximum= 4.0)
Comprehend the 5 W's in a text	3.5
Follow directions	3.83
Memorize concepts	2.33
Organize materials	3.6
Perform basic math operations	3.67
Produce type-written work	3.33
Study effectively	3.67
Summarize others' ideas	3.5
Take notes	3.33
Use correct grammar	3.33

Critical Thinking and Problem-Solving

Teachers rated subskills for *critical thinking* and *problem-solving* as moderately to very important on the quantitative portion of the survey (Table 2.5). Two subskills, *reason effectively* and *make judgements and decisions*, earned mean scores of 4.0. However, *use systems thinking*, also a subskill within this broader skill area, had one of the lowest scores, with a mean of 3.5. Teachers discussed critical thinking and problem-solving during the focus group. They suggested that learning experiences best supporting student growth included opportunities to address authentic problems that students encounter in everyday life. One teacher stated, "Middle schoolers need to learn how to problem solve. But not the problem I put before them. Problems that they notice. First they have to notice and question and think." This comment, emphasizing student ownership and independent thinking, echoed survey responses that discussed the purpose

of middle-level education. It indicates alignment between teachers' perceptions of their purpose as middle school teachers and the skills students need to succeed in and out of school.

Table 2.5

Teachers' Perceptions of Importance: Critical Thinking and Problem Solving Subskills

Subskill	Mean score (maximum= 4.0)
Reason effectively	4.0
Use systems thinking	3.5
Make judgments and decisions	4.0
Solve problems	3.67

Interpersonal Skills and Leadership

Teachers believed that students must learn to communicate with their peers as well as exercise leadership (Table 2.6). They indicated that students should learn to *interact effectively with others* (mean=4.0), *work in diverse teams* (mean=3.83), *guide and lead others* (mean=3.63), and *communicate clearly* (mean=3.57). One teacher wrote on the survey that students "should learn that they can make changes if they approach a problem with an eye on solutions, research, teamwork, and creativity," as well as "how to respond to situations when they are uncomfortable." During the focus group, teachers discussed a need to teach students how to disagree while still respecting others' opinions in a collaborative environment. Said one teacher:

> I'd like to teach kids, going along with what you said, being unique, don't be afraid to be different, I'd like to teach kids how to disagree without fighting. Because I think that's such an important skill throughout life. You know [another teacher] and I could be completely different, completely on opposite ends of a disagreement and we, neither one of us may be wrong, so can we communicate

with each other without it turning into a fight? In other words, I vehemently disagree with you, you don't agree with me, but that's OK.

Teachers explained that students equated disagreement with conflict, as divergent views often resulted in verbal arguments rather than efforts to understand others' perspectives. They believed that being able to teach them how to engage in civil discourse would support their development of broader interpersonal skills in school and beyond.

Table 2.6

Teachers' Perceptions of Importance: Social and Cross-Cultural Skills, Communication, and Leadership Subskills

Subskill	Mean score (maximum= 4.0)
Interact effectively with others	4.0
Work effectively in diverse teams	3.83
Guide and lead others	3.67
Communicate clearly	3.57

Self-Direction and Productivity

Teachers considered subskills within the skill *initiative and self-direction* among the most essential for students' success (Table 2.7). *Manage goals and time* earned a mean score of 3.83, while *work independently* and *be self-directed learners* each had mean scores of 4.0. In the focus group, teachers maintained that students should understand how to accept and learn from failure. They noted students' tendency to give up, disengage, or refuse to try for fear of failing at a task. One teacher stated she wanted her students to learn "how to fail and move forward after failure. And not just use that as like, 'I failed, I'm done,' but, 'I failed, what's my next step?'" Another echoed this sentiment, suggesting that new approaches and strategies can stem from failure: "Failure kind of shows us what we're not good at…and sometimes failure kind of pushes us in a

different direction." Notably, though ostensibly related to *initiative and self-direction*, subskills falling under the skill *productivity and accountability* were among the lowest rated: *manage projects* and *produce results* each had mean scores of 3.33.

Table 2.7

Teachers' Perceptions of Importance: Self-Direction and Productivity Subskills

Subskill	Mean score (maximum= 4.0)
Manage goals and time	3.83
Work independently	4.0
Be self-directed learners	4.0
Manage projects	3.33
Produce results	3.33

Creativity and Adaptability

Teachers rated *creative thinking* among the most essential subskills (mean=4.0), as shown in Table 2.8. They also considered *be flexible* an essential competency (mean=3.83), and they rated *adapt to change* slightly lower (mean=3.63). Teachers discussed these skills in some depth during the focus group. One indicated that creative thinking could help students avoid conflict, indicating that creativity could lead them to "find different solution format… [and] find your own ways and don't be afraid that you will be different" when disagreements arise. Others spoke of the need for students to become adaptable, flexible, and resilient in the face of failure. Said one teacher:

> We are going to have failure but what are the good things? [Students need to ask themselves] what are the positive [things] that can come out of that [failure]? What were things I was good at? What were some things that I'm not good at? I need to set achievable goals.…I'm going to put my mind to it and I'm going to push

through it, you know, I have to work hard to actually accomplish [them]. It's not just going to be put on my plate.

For this teacher and several of her colleagues, the objective was not for students to use their creativity and adaptability to avoid failure, but rather, to learn from it. "Resilience is cool," said a teacher, "but I also think failure kind of shows us what we're not good at and…we need to accept the fact that we can't be good at everything. And, and sometimes failure kind of pushes us in a different direction." Such comments supported the relatively high scores that creativity and adaptability subskills received on the quantitative portion of the survey.

Table 2.8

Teachers' Perceptions of Importance: Creativity and Adaptability Subskills

Subskill	Mean score (maximum= 4.0)
Think creatively	4.0
Work creatively with others	3.83
Adapt to change	3.63
Be flexible	3.83

(RQ1c) Which 21st century skills do teachers at CCA think they currently teach? How are these skills these actually integrated into learning tasks?

The task analysis provided quantitative evidence of the degree to which teachers acted on their beliefs regarding the importance of specific skills, and the degree to which teachers' perceptions of their teaching practice reflected actual practice. The findings are discussed below in relation to four skill categories: (1) critical thinking and problem solving; (2) interpersonal skills and leadership; (3) self-direction and productivity; and (4) creativity and adaptability.

Critical Thinking and Problem-Solving

Teachers believed that they taught *make judgements and decisions* (mean score=3.5 of 4.0) more frequently than other critical thinking subskills (Table 2.9). The task analysis revealed some attention to the skill (mean=2.63), though it also indicated that teachers focused more on *problem solving* (mean=2.81), the subskill they believed they taught least in this area. Perceptions of practice and actual practice were more consistent for *systems thinking*, which received one of the lowest mean scores for perceptions of current practice (2.83) and the lowest mean score for actual practice (1.0).

Table 2.9

Teachers' Reported Frequency of Instruction vs. Actual Instruction: Critical Thinking and Problem Solving Subskills

Subskill	Teachers who believe they currently teach this skill (mean survey score; maximum=4.0)	Teachers' actual integration of skill (mean task analysis score; maximum=4.0)
Reason effectively	3.0	2.27
Use systems thinking	2.83	1.0
Make judgements and decisions	3.5	2.63
Solve problems	2.5	2.81

Interpersonal Skills and Leadership

Teachers believed that they taught students to *communicate clearly* to a moderate extent (mean=3.0), but task analysis data suggested they integrated this subskill to a greater degree than they perceived (mean=3.18), as shown in Table 2.10. In contrast, teachers thought they integrated other subskills more deeply than task analysis data indicated. For example, the mean score for teachers' perceptions of teaching students to *interact effectively with others* was 3.67, though the mean task analysis rating was 1.9. Similar discrepancies may be found in relation to

subskills including *work in diverse teams* (perception=3.5; actual=1.73), *work creatively with others* (perception=3.5; actual=1.6), and *guide and lead others* (perception=3.0; actual=1.45).

Table 2.10

Teachers' Reported Frequency of Instruction vs. Actual Instruction: Communication, Social and Cross-Cultural Skills, and Leadership Subskills

Subskill	Teachers who believe they currently teach this skill (mean survey score; maximum=4.0)	Teachers' actual integration of skill (mean task analysis score; maximum=4.0)
Communicate clearly	3.0	3.18
Interact effectively with others	3.67	1.9
Work effectively in diverse teams	3.5	1,73
Guide and lead others	3.0	1.45

Self-Direction and Productivity

Teachers believed they taught students *to be self-directed learners* to a relatively high degree (mean=3.67), yet the actual depth of integration was among the lowest of all subskills (mean=1.45), as shown in Table 2.11. Teachers' perceptions of their practice were somewhat closer to actual practice in other subskills, including *manage goals and time* (perception=2.83; actual=2.0), *work independently* (perception=3.33; actual=2.55) *manage projects* (perception=2.83; actual=1.55), and *produce results* (perception=3.9; actual=2.36).

Table 2.11

Teachers' Reported Frequency of Instruction vs. Actual Instruction: Self-direction and Productivity Subskills

Subskill	Teachers who believe they currently teach this skill (mean survey score; maximum=4.0)	Teachers' actual integration of skill (mean task analysis score; maximum=4.0)

Manage goals and time	2.83	2.0
Work independently	3.33	2.55
Be self-directed learners	3.67	1.45
Manage projects	2.83	1.55
Produce results	3.0	2.36

Creativity and Adaptability

Teachers perceived themselves as teaching students to *think creatively* to a relatively high degree (mean=3.33); however, the task analysis suggested they integrated the skill to a low degree (mean=1.9), as shown in Table 2.12. Likewise, teachers believed they taught students to *be flexible* (mean=3.33) and *adapt to change* (mean=3.5) to an equal or higher degree than teaching them to *think creatively*, but according to the task analysis, integrated these competencies even less than *think creatively* (mean=1.82 and 1.36, respectively).

Table 2.12

Teachers' Reported Frequency of Instruction vs. Actual Instruction: Creativity and Adaptability Subskills

Subskill	Teachers who believe they currently teach this skill (mean survey score; maximum=4.0)	Teachers' actual integration of skill (mean task analysis score; maximum=4.0)
Think creatively	3.33	1.9
Work creatively with others	3.5	1.6
Adapt to change	3.5	1.36
Be flexible	3.33	1.82

(RQ1d) In which domains of teaching efficacy (personal, general, domain-specific) do CCA teachers report feeling strongest and weakest?

Quantitative and qualitative survey data, as well as the focus group discussion, provide evidence of teachers' sense of efficacy. This section examines teachers' sense of general teaching efficacy, personal teaching efficacy, and domain-specific efficacy for teaching 21st century skills.

General Teaching Efficacy

General teaching efficacy refers to teachers' beliefs about the power of external factors such as institutionalized inequalities, social issues in the home or community, family emphasis on education, or individual student needs in relation to the influence of teachers and schools (Tschannen-Moran, Woolfolk Hoy & Hoy, 1998). Teachers identified multiple, interrelated structural and cultural factors they believe undermine their efforts to teach the skills they identified as essential for student success. According to teachers, factors including standards and accountability measures, the public education system, and family influence, posed challenges that limited their sense of general teaching efficacy.

Standards and Accountability Measures. Teachers believed academic standards comprised one obstacle to teaching real-world skills. The focus group discussion addressed perceived constraints levied by adherence to standards and accountability measures. Teachers agreed that the skills they believed essential for students' success were not the same skills state assessments tested. Consequently, teachers struggled to justify taking time from the latter to teach the former. Said one teacher:

> In order to teach somebody how to get along or how to fail or how to have a conversation and disagree, you have to talk with them, show them, talk through it

> and let them see the failure and then see where the new learning can be. In a day and age when it's all about meeting standards and test scores and all things are driven [by] that, where's the time to support the kid in things that aren't linked to test scores?

For this teacher, content tested on state assessments took precedent over other competencies given the high-stakes nature of the assessments for both teachers and students. Several of her colleagues agreed that due to limited time, teachers' attention and energy needed to go to content standards. Teaching 21st century skills not only took more time than teaching some content standards because it reflected new learning, but it also took time away from learning teachers believed parents, policymakers, and the public perceived as more important.

In addition to concerns about time limitations, teachers expressed concern that standardized assessment measures brought teacher accountability issues to the fore in a way that limited their ability to pursue alternative instructional outcomes. Teachers argued their aims as middle-level educators were at odds with community perspectives on the purpose of schooling. This created a sense of anxiety over being labeled as failing if they did not adhere to public demands. One teacher said:

> How does the public evaluate us? They're evaluating us strictly on skills, on standards, and how much of the things we've been talking about are standards? Really very little of it. I mean obviously we all understand that these kids need basic skills and our job is to make sure we get those. But very little of what we've just been talking about is just simply basic skills. And yet we're evaluated on those basic skills….The public is trying to find a way to keep score, and I get that, they want to hold us accountable, I get it. But because the scorekeeping simplifies

> what is a really complex idea of kind of getting these kids where they need to be…the whole idea of scorekeeping is really fighting against a lot of what we're talking about.

Such comments revealed a tension between wanting to teach the 21st century skills teachers believe to be important, and teaching the academic content and skills that teachers feel required to emphasize due to public accountability expectations. A fear of reprisal from parents, district leaders, and other stakeholders for poor performance on standardized assessments seemed to weaken their sense of efficacy for pursuing 21st century skills in their classrooms.

Education System. During the focus group, the discussion above evolved into dialogue on the structure of schools and public perceptions of the validity of this structure. According to teachers, the public education system prizes conformity over individualization, as reflected in academic standards, and teachers believe "we're fighting it all the time." One teacher stated, "The public expects and sees a certain vision of what a school looks like. And unfortunately, that vision just isn't always accurate and sometimes it's the opposite of what we're trying to do." Another added:

> I personally have felt like, this has to stop. We have to also look at the system. And we do have to look at standards. And I'm not against standards. But I think there is more room for more flexibility and more success. Um, and failure within that success. There's definitely room for an overhaul in the education system.

Teachers saw this system as not only impacting their choices and opportunities as professionals, but ultimately, hurting students. Said one teacher, "I think there are kids that are 'failing,' I put that in quotes, because the way we're [teaching standards], and the way schools are designed just doesn't work for them."

Yet, some teachers expressed a sense that overcoming this challenge was not impossible, as illustrated in the following exchange:

Teacher 1: Do you think it's impossible to, within some of the structures that we do have, it's impossible to change in the sense that we can't?

…

Teacher 2: It absolutely is possible. But it takes a lot of courage.

Teacher 1: Well of course, yea.

Teacher 2: And it takes a leader who's willing to put her neck on the line.

Teacher 1: Yea.

Teacher 2: And it takes teachers that are willing to understand that there's going to be criticism and there could be some outrage.

Teacher 1: Right.

Teacher 2: Because you're not doing things the way they've been done in the past. Is it possible? Yes. Absolutely. But all I'm saying is that it's not easy.

Teachers saw themselves as combatting a system that contradicted their beliefs about supporting student success. Their general teaching efficacy was limited by a sense that the education system had imposed obstacles that limited opportunities for teachers and students. However, their comments also suggested a belief that overcoming these challenges may be possible.

Family Influence. Teachers also cited the role of parents and families as an obstacle to teaching 21st century skills. For example, teachers noted in the qualitative portion of the survey that "unreasonable parents with unreasonable demands," "parents that do not parent," and problems reaching parents through varied means of communication can make it difficult for teachers to achieve their goals. Another teacher acknowledged that cultural differences between

home and school "is also something that I have a hard time relating to." In most cases, teachers connected these factors to their inability to support students' effort, work completion, and positive conduct in class.

During the focus group, teachers further discussed the incongruous behaviors that some students encountered at home and school. They explained this made it difficult to teach competencies such as 21st century skills if students had not previously seen these modeled at home. One teacher explained:

> Middle school is a time where it's that line of, 'OK, I can, I understand things on my own now and I can make sense of things on my own,' and sometimes that questions and challenges what's happening at home. So the obstacle of saying, or like, of teaching students what are the right choices, what are the good things, what should you be doing even if that means you're doing the opposite of what's happening at home, the opposite of what you thought right now were your role models, which is challenging.

Teachers expressed a sense of helplessness to combat home influence because the influence was too strong, or because they did not believe they personally possessed the skills to do so. This is further evidence of their relatively weak general teaching efficacy.

Personal Teaching Efficacy

Teachers generally demonstrated a stronger sense of personal teaching efficacy along two dimensions: (1) efficacy for student engagement and (2) efficacy for instruction. Comments from survey responses and the focus group discussion suggested teachers felt comparatively less self-efficacy for classroom management.

Efficacy for Engagement. In the qualitative survey items, teachers wrote that strong classroom engagement involved students' "participating in class with relevant and meaningful activities and with good discussions, teamwork, problem-solving, critical thinking, helping their peers, talking about the topic, responding, collaboratively learning, creating their knowledge, struggling but eventually succeed at the activity." In such a setting, most teachers described the role of the teacher as "[being] there as a support or a guide, learning with students, challenging students, providing feedback." Teachers attributed challenges with engagement to students' lack of motivation, emotional or behavioral problems, "[lacking] a lot of support at home," a history of "being passive consumers of information" in school, a "belie[f] they cannot be successful," and a tendency to resist complex student-centered tasks.

Teachers reported that strategies for motivating students who showed low interest included strengthening relationships, building on interests and strengths, providing additional support and scaffolding, offering positive reinforcement, and communicating the importance and relevance of current learning for the future. "I communicate my confidence in them and their future and, I always emphasize the supreme value of respect," wrote one teacher on the survey. "In addition, I explain the learning goals of the unit and explain the unit's value and how it is connect with their goals, interest and concerns." Teachers also emphasized the importance of ensuring that the task itself supports engagement. "Are students grappling with the issues at hand?" asked one teacher when discussing student engagement during the focus group. "Are they working through critical and creative thinking?" Teachers reported that they continued trying new strategies to engage students until they found approaches that were successful; one teacher wrote on the survey, "I try not to give up." Such responses suggested a generally strong sense of efficacy for supporting student engagement.

Efficacy for Instruction. Teachers commonly reported using instructional strategies such as cooperative or collaborative learning and inquiry-based learning. "I've used collaboration most often. First to engage and generate interest, then to reduce confusion and show a plan, and lastly to learn how to collaborate to learn and be accountable to self and a group," wrote one teacher on the survey. Another noted, "I found that the mixed ability grouping and small class sizes that I was assigned to teach lent well to cooperative learning. Students held each other to a higher accountability when sharing instructional tasks." Most also discussed providing opportunities for student choice. Teachers explained that they chose these strategies because they resulted in deeper engagement and helped them address individual needs. "These practices and strategies have shown me the most success and student engagement," wrote one teacher, adding, "their learning is decided by themselves and they explore what is interesting to them." A second teacher emphasized that student choice allowed for differentiation based on current proficiency level, writing that as a result of offering choices, "Students can learn at their own level and be challenged where they are."

Teachers attributed students' learning challenges to a lack of academic skills, behavior concerns, low motivation, or weak learning habits. "Academics is not a priority in their day or life," suggested one teacher, while another offered, "[A learning challenge] usually stems from a lack of a strong foundation in math or ELA." Another emphasized student frustration and resistance resulting from poor self-regulation. "I find that when my students are faced with a setback, asking for help from me or from peers does not come to mind as a solution. Instead distraction, frustration, or apathy sets in, creating a barrier that prevents students from overcoming their setbacks," the teacher wrote. Teachers addressed these challenges by "emphasizing that effort and perseverance are key," "taking care to validate the feelings that

students express in response to being challenged," "hav[ing] a lot of patience," and "provid[ing] different strategies for the student to use." One teacher spoke of her belief that she and her grade-level partner were improving their instruction:

> I think there are really positive things going in the right direction [for student learning]. From my experience in my classroom and in [my partner]'s classroom, I know for a fact that we're going through that. And I know that [the principal] has given us the go-ahead to fail as teachers and try some stuff out and kind of see how it goes. So I do think that we are moving in the right direction.

This teacher felt confident in her ability to try new approaches, even those that might fail, in an effort to improve student learning. In contrast, another teacher's comment during the focus group suggested doubt in his ability to adopt non-traditional instructional practices. The teacher offered:

> I would love if [we] have kids that are better at project-based learning, well why can't they be with a teacher [for whom] that's their strength, that's their interest, that's what they're really good at? Instead of just going to a teacher who maybe that isn't their strength and saying, 'Well this is what you have to do.'….Whereas we might have [a teacher] right down the hall who's really good at what this kid really needs, and yet I'm being asked to do it because they just happen to be in the grade level that I've been assigned to.

This teacher suggested he might not have the professional expertise to adopt new practices on his own, but collaborating with other teachers might support him in achieving this. None of the teacher's colleagues agreed with or responded to his comment, suggesting either that this was an isolated sentiment within the focus group or that others did not feel comfortable expressing

agreement. In either case, it indicates that efficacy for instruction is not consistently high, as at least one teacher expressed qualms about his ability to implement new instructional approaches.

Efficacy for Classroom Management. Teachers reported in their survey responses that strong classroom management is evident in learning environments where students "know the expectations" and "act with a firm understanding of classroom rules and routines," are "focused on their learning and keeping track of their own learning," and understand "how to seek answers or be productive while waiting for teacher assistance." They described such classrooms as having "a working 'buzz,'" in which "there is movement and noise, but there is [also] control and focus." Teachers stated that consistently reinforcing expectations helped prevent or redirect disruptive behaviors. However, survey comments showed that at least some teachers had a lower sense of efficacy in this area. For example, one teacher noted that she spent "so very much time on the disruptive behaviors (often with little improvement)." Another reported on the survey that external factors such as the time of day and "circumstances with students" could be "more powerful than successful classroom management."

Focus group responses also suggested lower efficacy for classroom management. Six of nine teachers stated that students challenged them when they tried to enforce expectations. They explained that students provoked them to engage in power struggles in an effort to turn attempts at redirection into "this one-on-one thing." Said one teacher:

> I can't tell you how many times I feel like I'm being challenged….I can't sit there and have that conversation while I still have to run a class. Or if I have to have three of these conversations in a class then I can't attend to other voices that don't have the same process and needs….I've tried really hard to make sure I'm there and open and understanding and calm, but I don't know if I'm equipped enough

to have the vocabulary and the know-how to say, 'OK, but this is how we're doing it here. And these are our school rules.' Is [saying] that enough?

This teacher doubted her ability to address direct challenges from students. Other teachers displayed a stronger efficacy for classroom management, pointing out that it was possible to combat behavioral challenges with engaging, purposeful instruction. One teacher explained that when students understood the real-world purpose of their learning, "the discipline problems—not all the time, but in many cases—just disappear because all of a sudden the motivation is there." Notably, a veteran teacher with 24 years of experience made this comment, while most teachers who expressed classroom management concerns had eight or fewer years of experience. Thus, personal teaching efficacy for classroom management may be a relative weakness across participants in this study, though the degree of personal efficacy varies among teachers.

Domain-Specific Efficacy

In general, teachers reported high levels domain-specific efficacy (Table 2.13). Teachers felt most confident teaching the subskill *work creatively with others* (mean score=3.83 of 4.0) and teaching students to *be self-directed learners* (mean=3.67). Alternately, teachers felt less confident teaching students to *adapt to change* (mean=3.33). They felt least confident teaching students to *solve problems* (mean=2.83). Other subskills, such as *use systems thinking*, *adapt to change*, and *manage goals and time*, were also relatively low in these ratings.

Table 2.13

Teachers' Self-Reported Sense of Confidence in Teaching Subskills

Subskill	Teachers' sense of confidence in teaching skill (mean survey score; maximum=4.0)
Think creatively	3.33
Work creatively with others	3.83

Reason effectively	3.17
Use systems thinking	3.17
Make judgements and decisions	3.67
Solve problems	2.83
Communicate clearly	3.33
Adapt to change	3.0
Be flexible	3.33
Manage goals and time	3.17
Work independently	3.5
Be self-directed learners	3.67
Interact effectively with others	3.67
Work effectively in diverse teams	3.5
Manage projects	3.33
Produce results	3.33
Guide and lead others	3.33

Note. Teachers rated themselves on a scale of 1 to 4. Higher scores correlate to a stronger sense of confidence.

Regarding skills they felt less confident teaching, teachers said that "learning about these skills," "training," "more strategies," and "sample teaching" would help to build confidence. The following focus group exchange describes the type of professional learning they believed would be most useful:

Teacher 1: I would love to learn more about different ways [to teach the skills]. Like right now we mentioned a lot of things that were obstacles. But a lot of what we were mentioning were big obstacles that were like

society obstacles, and so I would love professional development that sort of works with those obstacles in mind and just gives strategies of how can we….work with that and teach kids to have these life skills that we want them to have? So like a professional development that has like…

Teacher 2: Like developmental info.

Teacher 1: Yea.

Teacher 2: Like what is it that you expect developmentally from a brain of a sixth grader or seventh grader or eighth grader and what…

Teacher 3: Yes.

Teacher 2: …and what it's like in their thinking process. We have to think as a student, a child, not as an adult because we're more developed but…

Teacher 3: Yes, that is important.

Teacher 2: …They have their points, their peaks, so.

Teacher 4: Well and then professional development school-wide so it's a systems implementation for consistency in what we're asking kids to do.

This exchange suggests a desire from teachers for professional learning that is context-specific, offering strategies to teach 21st century skills specifically at the middle school level.

Thinking beyond traditional professional development models, one teacher noted a desire for more collaboration among staff to enrich his own performance. He expressed concern for his personal ability to integrate 21st century skills into student learning experiences because it required creative thinking and planning outside his standards-based content. The teacher

explained that he supported teaching 21st century skills, and he was interested in project-based learning, but added:

> It makes me nervous to say stuff like this. And let me tell you why. Because I'm really good at math. Really, really good at it. And I'm really bad at creative stuff.…And so when I say stuff like that it makes me nervous because then I'm afraid that the person I'm talking to is going to be like, 'OK, well, throw a unit like that together.' And now we've hit what I'm really weak at.…I need help creating that stuff. I need help. I'm so concrete, it's hard for me to break out of that.

The teacher noted that opportunities to collaborate with colleagues with complementary professional expertise would help counter his own perceived weaknesses.

Teachers also offered other suggestions to strengthen their efficacy for teaching 21st century skills. For example, one teacher said having more time with students in class would help her to feel more confident. She offered:

> Are we looking for one right answer or are [students] grappling with the issues at hand? Are they working through critical and creative thinking?….It's tough to get into some of these deeper discussions we should have in such a relatively short amount of time.

Similarly, arts teachers noted that it can be difficult to integrate higher-order skills into trimester-long courses. Additionally, one teacher expressed she would feel more confident if she understood how teaching additional skills could support content area standards so that she could maximize her limited class time and pursue both sets of outcomes simultaneously. Given feelings

that their instructional time was dominated by a focus on disciplinary standards, teachers felt that more time to supplement the existing curriculum would help them teach 21st century skills.

Finally, although most teachers identified supports or strategies that could help them teach 21st century skills, one teacher expressed uncertainty about what additional supports or strategies might be necessary. She stated:

> I think we're on the right track. I think there's a lot of things in place that we've been working on that are leading to this style of teaching. Um, and there's also room for improvement and room to get better….You don't know what you don't know, right? So it's like, yea, we want to get there, but it's like, what does that look like and what do those teaching skills look like? …Whatever that solution looks like, getting to that next point and next step and continuing to grow. And how do we correctly develop our teaching and our school and our students?

Despite feeling hopeful and eager to continue on the path toward integrating 21st century skills, the teacher was unsure about what might be required to achieve this.

The data detailed above describe CCA teachers' beliefs, perceptions, and practices in relation to 21st century skills as of spring 2018. The next section discusses the implications of these data from the survey, focus group, and task analysis, and how these implications may inform an intervention to strengthen teachers' integration of 21st century skills into student learning tasks.

Discussion

According to the outcomes of this study, teachers at CCA support a movement toward deeper 21st century skill integration—at least in theory. They understand their professional mission as middle-level educators as preparing students to make choices resulting in personal

independence and helping students aid others in the future. They believe they must teach core academic content and skills to help prepare students for high school, but that this should not be the extent of students' learning in middle school; rather, students must also learn the non-academic or 21st century skills that will help them understand and improve themselves and the world.

Consistent with this thinking, teachers rated the 21st century subskills *think creatively*, *reason effectively*, *make judgements and decisions*, *work independently*, *be self-directed learners*, and *interact effectively with others* as most essential for their students' future success. In contrast, traditional skills such as *memorize concepts* and *take notes* received relatively low mean scores. Such data affirm that teachers are philosophically inclined to integrate 21st century skills into student learning tasks alongside, though perhaps not in place of, more traditional academic content and skills.

While they considered many 21st century subskills to be critical for student success, teachers generally perceived that they taught these skills to a greater degree than they actually integrated them into student learning tasks. The greatest discrepancies could be found when comparing perceptions and practice in teaching students to *adapt to change* and *be self-directed learners*, followed by *work creatively with others* and practice *systems thinking*. Teachers most accurately perceived the extent to which they taught students to *communicate clearly*; this was also the only subskill in which actual practice scored higher than teachers' perceptions of their practice. Discrepancies between perceived and actual practice were also lower in relation to teaching students to *work independently*, *manage goals and time*, and *make judgements and decisions*.

Importantly, even where subskills were evident in student learning tasks, their presence alone did not necessarily mean that teachers had explicitly taught or assessed these skills. The implicit message embedded in these tasks was that, while 21st century skills might be useful, they could not compete for instructional time and focus with competencies likely to appear on standardized assessments. Likewise, though some tasks created opportunities for students to perform more efficiently or effectively by using 21st century skills, students may have been equally successful on these tasks if they had relied solely on more traditional skills. The needs assessment affirmed that 21st century skills were not deeply, meaningfully, or consistently integrated into student learning tasks.

Notwithstanding these results, teachers generally reported feeling confident teaching 21st century skills. Their beliefs about the importance of 21st century skills may have contributed to a stronger sense of domain-specific efficacy (Windschitl & Sahl, 2002; Xu, 2012). Yet, as noted above, teachers also believed they integrated them to a greater degree than the task analysis indicated. These inconsistent data may suggest inflation in teachers' quantitative domain-specific efficacy self-ratings. This inflated sense of efficacy may be the result of teachers' diverse understandings, or misunderstandings, of specific 21st century subskills. The needs assessment did not evaluate the degree to which teachers shared a common understanding of *be flexible*, for example, and did not provide indicators to help teachers define each competency. Therefore, when completing the survey, teachers may have interpreted subskills in ways that did not align with the task analysis rubric. This may partially explain the discrepancy between belief and practice.

Teacher survey responses also revealed relatively high levels of teacher efficacy for instruction and engagement. According to these findings, teachers may be more apt to promote

student-centered learning and student collaboration, support higher-order thinking, and experiment with new instructional approaches (Allinder, 1994; Ashton & Webb, 1986; Haney et al., 2002; Nie, Tan, Liau, Lau, & Chua, 2012). Likewise, they are more willing to maintain challenging expectations and view students as capable of independent and creative thought (Ashton & Webb, 1986; Dembo & Gibson, 1985; Yeung et al., 2014). Such characteristics support the conclusion that teachers are philosophically ready to integrate 21st century skills into everyday learning experiences, though they perceive obstacles preventing them from doing so.

In contrast, teachers demonstrated weaker efficacy for classroom management. This may limit teachers' integration of 21st century skills, which can require fluid organizational structures, increased student ownership of the learning environment, and opportunities for greater student leadership, collaboration, and communication. Teachers with a lower sense of efficacy for classroom management may fear disruptions and a loss of control that accompany this new approach to teaching and learning; this may result in traditional teacher-centered pedagogies that are more likely to preserve adult control, rather than those which promote student autonomy and choice (Ashton & Webb, 1986; Bonwell and Eison, 1991; Woolfolk & Hoy, 1990). This lower sense of personal efficacy for classroom management may help to explain the limited degree to which teachers have integrated 21st century skills.

Finally, teachers' general teaching efficacy was also relatively weak. Reflecting the tension inherent in standards-based systems (Schoen & Fusarelli, 2008; Szczesiul et al., 2015), teachers suggested that external obstacles, including traditional content structures and accountability systems, tended to obstruct efforts to teach 21st century skills. These teachers felt compelled to align their instruction with standardized assessments whose results were reported and evaluated by the public (Loeb et al., 2008). Moreover, they believed students' home and

family structures similarly presented obstacles to 21st century skill instruction. In some cases, teachers expressed concern that these challenges were too significant to surmount, even with effective professional practice, indicating a lower sense of general teaching efficacy (Gibson & Dembo, 1984). For these teachers, feeling a strong sense of personal efficacy or domain-specific efficacy might seem insufficient to overcome structural, cultural, or individual obstacles.

Conclusion

The overarching research question guiding this needs assessment asked, *What factors limit the integration of 21st century skills into middle school learning tasks?* Based on the results above, teachers feel most constrained by traditional content structures, which includes content standards and accountability measures such as standardized tests, and by a fear of losing control in the classroom. Further, despite relatively high self-ratings in domain-specific efficacy, qualitative responses suggest that teachers may not yet feel fully confident integrating 21st century skills into everyday learning experiences, especially if they lack a clear understanding of what this integration can look like in practice. Therefore, an intervention to address this problem of practice will need to examine models of teaching and learning that allow for the integration of 21st century skills with traditional academic proficiencies. This intervention does not need to concentrate on changing teachers' beliefs, as the findings show support for teaching 21st century skills.

Based on the strengths and needs described above, an intervention to address the problem of practice at the microsystem level will include the following components:

1. An integrated approach to teaching and learning that allows teachers to meet both academic standards and 21st century skills, using each to reinforce the other. This will allow teachers to work within the current educational system to meet accountability

demands while also teaching the competencies they believe matter most for students' future success.

2. Authentic learning experiences exploring academic standards and 21st century skills in relation to real-world problems, using real-world tools, with real-world stakeholders. This will connect students' learning at home and school, empower students to better understand themselves and the world, offer a meaningful purpose for learning, and provide opportunities to individualize learning within a standards-based system.
3. An emphasis on student self-regulation to circumvent, minimize, or manage potential classroom challenges associated with increased student autonomy and collaboration, as well as challenges that may accompany students' disengagement from, or resistance to, new learning approaches. This will address concerns stemming from teachers' lower sense of efficacy for classroom management and support continued growth in this area.
4. Recognition of, and strategies to build on, current strengths such as teachers' efficacy for instruction and engagement, and teachers' belief in the importance of 21st century skills.
5. Targeted and systematic professional learning that allows for collaboration and develops strategies to teach 21st century skills, emphasizing how to design integrated, authentic tasks. Opportunities to learn and implement new learning will build knowledge and confidence to support personal and domain-specific efficacy.

The next chapter examines research literature related to these components and evaluates pedagogical models that address dimensions of these components. This literature review will inform an intervention to meet the 21st century teaching and learning needs of adults and students at CCA.

Chapter 3: Intervention Literature Review

To prepare for life outside of school, students must have opportunities to learn, strengthen, and apply the skills most conducive to their success in a globalized, post-industrial world—among them, creative thinking, problem solving, adaptability, and collaboration (Partnership for 21st Century Learning, 2015; Schoen & Fusarelli, 2008). Although many secondary schools in the United States refer to these 21st century skills in their guiding documents (Bencze & di Giuseppe, 2006; Slate, Jones, Wiesman, Alexander, & Saenz, 2008), teachers' classroom practices may integrate real-world competencies in a superficial or fragmented manner at best (Bencze & di Giuseppe, 2006; Scott, 2015; Szczesiul, Nehring, & Carey, 2015). As a result, many middle school students lack the opportunities to deeply and purposefully engage with 21st century skills on a consistent basis.

The previous chapter described a needs assessment conducted at the Culture and Communications Academy (CCA), a small magnet middle school in the northeastern United States. The needs assessment focused on microsystem, exosystem, and macrosystem factors (Bronfenbrenner, 1994) potentially contributing to students' limited opportunities to develop 21st century skills. According to the needs assessment results, teachers believed that 21st century skills were essential for students' future success. However, a task analysis indicated that these skills were not deeply or consistently integrated into student learning tasks. CCA's teachers collectively reported a high sense of personal teaching efficacy for instruction and engagement, but relatively low efficacy for classroom management. Further, teachers perceived their general teaching efficacy and domain-specific efficacy for teaching 21st century skills to be limited by content standards, accountability measures, and traditional content structures, all of which made it difficult to reconcile academic content with 21st century skills. Teachers also cited challenges

associated with student engagement and behavior as factors limiting their perceived ability to teach rigorous, real-world competencies. Teachers at CCA reported that more professional learning would help them feel more confident in teaching these skills. Specifically, they sought collaborative learning approaches that would help them make real-world connections and integrate academic content standards with 21st century skills in their classes.

This chapter discusses conceptual and theoretical frameworks as well as relevant research literature that address CCA teachers' needs. Specifically, the instructional core framework (City, Elmore, Fiarman & Teitel, 2009) is reconceptualized as an instructional core for 21st century learning, and this reconceptualized framework guides a literature review on academic task design. Subsequently, two additional frameworks—the P21 Support Systems Framework (Partnership for 21st Century Learning, 2015), which identifies criteria for 21st century professional learning, and a teacher efficacy theoretical framework—are discussed. These frameworks guide a literature review on professional learning. Both the task design literature and the professional learning literature inform the design of an intervention to support CCA's teachers in integrating 21st century skills into middle school students' learning experiences.

Intervention Content: Conceptual Framework

The instructional core (Figure 3.1) is a driver of systematic improvement in student learning, representing interactions among teachers and students in the presence of content (City et al., 2009). More specifically, the instructional core encompasses three components: teacher pedagogy, curricular content, and student engagement. City et al. (2009) argue that in order to improve student learning, reforms must concentrate on improving these three dimensions of classroom experience: teachers must implement effective pedagogical strategies, content must be rigorous and meaningful, and students must engage in learning. Any reform effort that does not

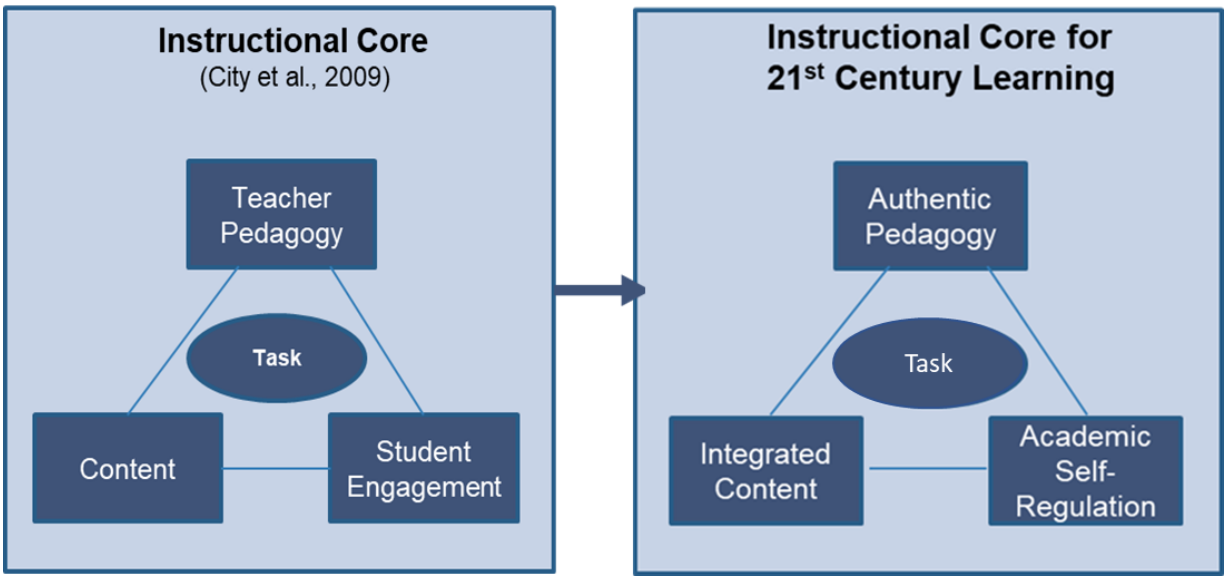
attend to all three components equally is unlikely to improve student learning and performance (City et al., 2009).

At the center of the instructional core, reflecting the intersection of pedagogy, content, and student engagement, lies the academic task. The academic task reflects "what students are actually doing" (City et al., 2009, p. 30) in the classroom. A central tenet of the instructional core framework is that *task predicts performance*; in other words, the work in which students engage predicts what they will learn (City et al., 2009). Therefore, improving student learning demands careful attention to academic tasks. In accordance with the instructional core, high-quality tasks should embody the principles of effective pedagogy, rigorous and meaningful content, and student engagement (City et al., 2009).

If the instructional core offers a framework to support schoolwide coherence (Newmann, Smith, Allensworth, & Bryk, 2001) for student learning, then an instructional core for 21st century learning (Figure 3.1) may be necessary to support student learning in relation to 21st century skills. This chapter develops the concept of an instructional core for 21st century learning by examining each component of the instructional core in relation to strategies or approaches that support students' development of 21st century skills. The first section considers authentic pedagogies that connect in-school and out-of-school learning, while the next examines curricular models that support integration of academic and non-academic content. The third section discusses academic self-regulation strategies that can promote purposeful engagement in 21st century learning. Task design models reflecting these components are explored as the basis for an instructional intervention.

Figure 3.1

Original Instructional Core (City et al., 2009) and an Instructional Core for 21st Century Learning



Authentic Pedagogies: Instruction for 21st Century Skills

Authentic pedagogies are an instructional approach to teaching 21st century skills (Preus, 2012). Although multiple models and definitions of authentic pedagogy exist, all are grounded in constructivist and situated learning theories that emphasize students' making meaning within authentic or real-world contexts (Brown, Collins, & Duguid, 1989; Ertmer & Newby, 1993). Three themes remain consistent across diverse models of authentic pedagogy: (1) students construct meaning and produce knowledge; (2) students use disciplined inquiry to construct meaning; and (3) students generate dialogue, products, and performance with value or meaning beyond success at school (Newmann & Wehlage, 1993; Newmann, Marks, & Gamoran, 1996).

Numerous frameworks build on these foundations to articulate authentic pedagogy standards. An early framework from Newmann and Wehlage (1993) identified five standards of authentic instruction. The first standard, higher order thinking, involves manipulating ideas to solve problems and arrive at independent conclusions. The second, depth of knowledge, involves

understanding the major concepts of a discipline. The third, substantive conversation, includes higher-order thinking, unscripted exchanges, and coherent dialogue. A fourth standard, connectedness to the world, suggests that instruction should address real-world issues or incorporate students' personal experiences as a context for learning. Finally, the fifth standard, social support, involves teachers' setting high expectations, demonstrating respect, and promoting inclusionary practices (Newmann & Wehlage, 1993). This framework serves as a foundation for later authentic learning frameworks such as those of Ballantyne and Packer (2009), Lingard, Hayes, and Mills (2001) and Rule (2006).

Several instructional models exemplify an authentic pedagogy framework and are occasionally evident in the research context of CCA. Project-based learning, or PBL, is "a teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging, and complex question, problem, or challenge" (Buck Institute of Education, 2018). The Buck Institute conceptualizes this approach as a strategy grounded in standards-based academic content, challenging problems or questions, inquiry, real-world or personal connections, student choice, critique and revision, and public voice (Buck Institute of Education, 2018). Studies of PBL's impact on students' 21st century learning have found that the model can support the development of skills such as initiative, communication, problem-solving, and innovation (Beckett & Miller, 2006; Boaler, 1999; Finkelstein et al., 2010; Johnson & Johnson, 2009). Morales, Bang, and Andre (2013) conducted a study among high school students enrolled in a technology elective. The course was designed around PBL principles, including using driving questions, authentic contexts, inquiry-based investigation, collaboration, and student direction and choice. The researchers observed students at multiple points during the school year, conducted focus student focus groups and interviews,

collected student work samples, and measured parents' and teachers' perceptions of student learning in the course through researcher-created online survey instruments. Morales et al. triangulated these measures, finding that the course improved students' competencies in several areas aligned with 21st century skills: social maturity, leadership, responsibility, communication, problem-solving, self-direction, creativity and inventiveness.

Two additional instructional models also found at CCA can similarly support authentic pedagogies. Simulation-based learning can approximate or replicate authentic scenarios when such scenarios are difficult to access in real life (Kong et al., 2014). It can contribute to 21st century skill outcomes by requiring students to solve complex, real-world problems through contextualized learning environments (Joyce, 2008; Kong et al., 2014). An alternative instructional model, service learning, may help students authentically apply these skills outside the classroom in a non-simulated experience (Billing, 2000). Service learning enables students to meet academic objectives and fulfill community needs through purposeful, organized learning experiences outside the classroom (Billing, 2000). It can contribute to learning in personal competencies that align with 21st century skills, such as leadership, social responsibility, collaboration, metacognition, and organization (Akin, Calik, & Engin-Demir, 2017; Kahne, Crow, & Lee, 2013; Richards et al., 2013).

While authentic instructional models demonstrate potential for addressing 21st century skills, they represent shifts in pedagogy more than curricular content; in fact, one of Newmann and Wehlage's (1993) standards of authentic instruction specifically emphasizes understanding major concepts of a discipline. As a result, although authentic pedagogies allow teachers to situate learning in authentic contexts, they ultimately entail teaching old content in new ways. Without a corresponding curricular change, 21st century skills remain an "add-on" rather than

the focus of instruction (Prensky, 2014). This may cause a fragmented or haphazard approach that can interfere with students' ability to develop complex understandings (Scardamalia & Bereiter, 2014), as has been the case in the context of CCA. Corresponding changes in content, another element of the instructional core (City et al., 2009), may be necessary to systematically teach 21st century skills. As discussed in the next section, an integrated curriculum may complement authentic pedagogies to facilitate the systematic integration of 21st century skills into student learning experiences.

Integrated Learning: Curricular Content for 21st Century Skills

According to the instructional core framework, teaching for 21st century learning requires not only instructional strategies that connect students with real-world contexts, but also consideration of the content that students learn in these contexts (City et al., 2009; Rotherham & Willingham, 2009). Addressing subject-specific academic standards within separate content areas reflects an artificial division of knowledge (Brazee & Capelluti, 1995). Outside of school, knowledge acquisition and application are not defined by disciplinary boundaries, but rather, influenced by the context in which learning occurs (Gee, 2008; Resnick, 1987). Therefore, a more integrated curricular approach can better reflect authentic learning processes, while also creating opportunities for students to engage with rigorous and meaningful content that transcends narrow disciplinary limitations (Gavelek, Raphael, Bondo, & Wang, 1999).

Curriculum integration exists along a continuum, progressing from discipline-specific approaches toward increasing disciplinary integration (Brazee & Capelluti, 1995; Drake, 2007). For example, Brazee and Capelluti's (1995) continuum begins with separate disciplines and moves to interdisciplinary models, in which activities in multiple disciplines center on a common theme but are regarded as one-off "break-in-the-action" and not "the serious business of the

school" (p. 34). Next on their continuum is an integrated curriculum, in which students study a theme or topic using concepts and skills from diverse disciplines, often in collaboration with others or over extended time periods. Drake (2007) refers to this as a transdisciplinary curriculum, which addresses real-world contexts, life skills, and student questions. An integrated or transdisciplinary curriculum allows neither academic nor 21st century skills to be taught in isolation, but rather, purposefully integrates both within a broader body of knowledge (Drake & Reid, 2018).

An integrated curriculum model expands the field of study and ensures that 21st century skills are equal to, connected with, and embedded in all other aspects of students' learning (Van de Oudeweetering & Voogt, 2018). Ross and Hogaboam-Gray (1998) examined the impact of integrated curricula in their comparative study of outcomes in two Canadian high schools. Ninth grade students in one school participated in an integrated science, math, and technology program that met seven times during one semester. Students in the other school did not have access to an integrated program. The researchers conducted observations, issued a 13-item motivation survey, and interviewed students and teachers throughout the duration of the courses. They found that students in the integrated program were better able to work together and engage in productive task talk, more motivated, and more likely to adopt a mastery orientation than their counterparts who did not share a similar experience. Students exposed to a program with an integrated curriculum had improved their proficiency in 21st century skills, including communication, collaboration, and self-direction (Ross & Hogaboam-Gray, 1998). A meta-analysis by Hurley (2001) confirmed this result, finding that higher degrees of curriculum integration are associated with more positive and comprehensive impacts on student learning.

Several challenges surround integrated curricular approaches. For example, Prensky (2014) points out that changing pedagogy is easier than changing content due to the personal and political nature of curriculum. Additionally, Simmons and El-Hindi (1998) identifies transformations in teachers' knowledge and practice that are necessary to support implementation of an integrated curriculum. These transformations include reframing the roles of teachers and students, affirming student voice, and restructuring the classroom environment to support student engagement (Simmons & El-Hindi, 1998). Therefore, proceeding with an intervention at CCA without teaching students how to engage with new content and authentic contexts may threaten the efficacy of an instructional or curricular reform. The next section addresses the need for academic self-regulation skills to support student engagement in authentic and integrated learning experiences.

Academic Self-Regulation: Student Engagement for 21st Century Skills

Students' ability to successfully engage in rigorous learning experiences increases as students develop academic self-regulation strategies that help them take responsibility for their learning (Pintrich & De Groot, 1990). Moreover, academic self-regulation can result in more positive and on-task behaviors (Alderman & MacDonald, 2015; Hofer, 2007), easing classroom management challenges that may be associated with student-centered pedagogies (English & Kitsantas, 2013). Academic self-regulation refers to cognitive processes that help learners engage with an academic task (Pintrich & De Groot, 1990; Zimmerman, 1998). It includes three phases: (1) forethought or planning, in which students establish a goal, plan steps, and allocate resources to support the goal; (2) performance, in which students maintain focus on the task, monitor and adjust attitudes or beliefs, and assess progress toward the goal; and (3) evaluation, in which

students evaluate learning processes or products in relation to the goal (Zimmerman, 1998). Within each phase, metacognitive strategies may help students engage more deeply in learning.

As it supports engagement in the learning process in general, academic self-regulation also supports the development of 21st century skills. Exercising academic self-regulation may help students demonstrate active rather than passive engagement (Cooper, Horn, & Strahan, 2005; English & Kitsantas, 2013) as they encounter 21st century learning experiences within authentic contexts, confront rigorous challenges, or integrate real-world competencies with knowledge of academic content to propose novel solutions. Further, teaching academic self-regulation strategies can directly contribute to students' development of specific 21st century skills such as initiative, self-direction, productivity, and responsibility (Butler, 2002; Sanz de Acedo Lizarraga, Ugarte, Cardelle-Elawar, Iriarte, & Sanz de Acedo Baquedano, 2003).

Teaching academic self-regulation strategies can directly support students' ability to engage in 21st century learning experiences. In one study, Cooper et al. (2005) examined the outcomes of a series of lessons involving instruction in rigorous content and self-regulation strategies in seven high school language arts classes. During lesson implementation, teachers modeled effective learning practices and encouraged students to monitor their effort. Researchers observed the classes, conducted interviews with teachers and students, and reviewed student reflection logs to measure the impact of this intervention on students. Analyzing these data, the researchers concluded that teaching academic self-regulation strategies reduced students' resistance to engaging in more challenging tasks (Cooper et al., 2005). This willingness to engage could help maximize effort, motivation, and learning as students encounter rigorous, integrated curricula and authentic learning experiences.

As it supports task engagement, teaching academic self-regulation strategies can also directly impact students' development of specific 21st century skills. In a quasi-experimental study of 40 middle school students, Sanz de Acedo Lizarraga et al. (2003) used the ACRA, a learning strategy scale; the EPIJ Personality Questionnaire; the BAS-3 social scale; and a teacher questionnaire to measure the impact on students of a specialized course and assessment system designed to teach academic self-regulation strategies. Comparing questionnaire and scale results before and after the intervention, the researchers found that the intervention positively impacted students' academic self-regulation, as well as their self-control, empathy, and awareness of others (Sanz de Acedo Lisarraga et al., 2003). These outcomes correspond with 21st century competencies such as self-direction, productivity, responsibility, interacting effectively with others, and working effectively in diverse teams (Partnership for 21st Century Learning; Pintrich & Zusho, 2002). In turn, strengthening these skills may further improve students' ability to engage in rigorous and authentic learning.

Academic self-regulation can strengthen students' engagement with, and development of, 21st century skills. However, according to the instructional core, this engagement must occur in relation to both effective pedagogies and rigorous content (City et al., 2009). The next section examines the intersection of instruction, content, and engagement to support 21st century skills, looking specifically at the role of the academic task in merging these strands of the instructional core.

Task Design for 21st Century Learning

To purposefully and systematically integrate 21st century skills into student learning, three components of the instructional core—teacher pedagogy, content, and student engagement—must be reconceptualized specifically for 21st century learning. This

reconceptualization demands attention to the central tenet of the instructional core—the task. Given that the instructional core coalesces around the academic task (City et al., 2009), a task design model that incorporates each component of an instructional core for 21st century learning—authentic pedagogies, integrated content, and academic self-regulation—may facilitate teachers' integration of 21st century skills into student learning experiences. This section applies the conceptual framework of the instructional core to review literature guiding the selection of a task design framework for 21st century learning.

Academic Task Design Models for 21st Century Learning

In the instructional core framework, an academic task represents the intersection of three equally essential facets of student learning: pedagogy, content, and student engagement (City et al., 2009). By one definition, academic tasks are "meaning-based activities…in which learners have to achieve a genuine outcome…and in which effective completion of the tasks is accorded a priority" (Klapper, 2003, p. 35). More fundamentally, tasks are the actual work in which students engage as part of the learning process (City et al., 2009). Tasks organize and direct learners' thought and action (Doyle, 1984); accordingly, the tasks in which students engage can help to predict what they will learn (City et al., 2009).

Schools that intend for students to become proficient in 21st century skills must ensure they systematically embed opportunities to develop, practice, and refine these skills within academic tasks. If authentic pedagogies, integrated content, and academic self-regulation all support 21st century learning, then it follows that all must be reflected in a task's design. Multiple frameworks examined below have emerged to support the design of tasks that embed 21st century skills; however, some do not integrate all three elements of the instructional core. One task design framework that successfully merges all three components, the 6 A's Framework

(Steinberg, 1997), is selected as the basis of an intervention to support 21st century skill integration at CCA.

Content or Context Task Design Models

A variety of task design models have been developed for specific content areas or contexts such as online learning environments. For example, Hampel (2006) applied language learning theories to identify characteristics of effective language acquisition tasks in online learning environments. Such tasks provided opportunities to share diverse perspectives and ideas, collaboratively solve problems, engage in real-world roles and scenarios, and emphasize meaning. Hampel's task design model addresses the integration of 21st century competencies such as collaboration, communication, and problem-solving (Partnership for 21st Century Learning, 2015), and integrates authentic pedagogies by promoting real-world roles and scenarios (Newmann & Wehlage, 1993). However, the model does not directly involve opportunities to develop or support academic self-regulation, a need identified by CCA teachers in the needs assessment.

Own it, Learn it, and Share it

The Own it, Learn it, and Share it framework (Lee & Hannafin, 2016) guides the design of tasks that promote autonomy, scaffolding, and an authentic audience. Task design guidelines call for tasks that promote personal goal-setting, meaningful choices such as students' selection of authentic problems or resources, support for individual needs, content vocabulary, self- and peer assessment, and engagement and dialogue with diverse audiences (Lee & Hannafin, 2016). The framework strongly supports academic self-regulation principles such as setting goals, selecting resources, and monitoring progress (Zimmerman, 1998). Additionally, it reflects authentic learning principles with its emphasis on dialogue, social support, and personal

relevance (Newmann & Wehlage, 1993). However, the model also emphasizes disciplinary content as opposed to integrated or transdisciplinary content, suggesting that it does not align as closely with the curricular approaches necessary to integrate academic standards with 21st century skills at CCA.

TARRGET Framework

The TARRGET framework (Ames, 1992) also addresses several components of an instructional core for 21st century learning. The framework requires that task designers consider the rigor and relevance of a task, and create opportunities to balance student autonomy and support, facilitate peer grouping, and provide evaluative feedback (Ames, 1992). Elaborating on this framework, Fisher and Frey (2010) emphasized the importance of task complexity, arguing that a task should require the application of grade-appropriate concepts to new situations and embrace opportunities for productive failure. They added additional structures and supports, such as language support and teacher prompting, as key components for meaningful learning tasks (Fisher & Frey, 2010). Like the Own it, Learn it, Share it framework (Lee & Hannafin, 2016), TARRGET (Ames, 1992; Fisher & Frey, 2010) highlights critical aspects of both authentic pedagogies and self-regulation, but does not address the role of integrated learning and 21st century skills.

The 6 A's Framework

The 6 A's Framework (Steinberg, 1997) emerged from the context of school-to-work reform efforts in the 1990s. School-to-work reforms proposed merging workplace competencies with high academic standards (Yan, Goubeaud, & Fry, 2004) in order to elevate learning expectations and strengthen students' potential for future success (Steinberg, 1997; Steinberg, Cushman, & Riordan, 1999). The reform movement advocated for practices such as: (1) using

authentic contexts to teach higher-order academic content; (2) emphasizing problem-solving and other transdisciplinary skills within academic learning; (3) using community-based investigations and projects to extend learning beyond the classroom; (4) providing students access to adult mentors or coaches; (5) applying real-world standards to produce high-quality student products; and (6) developing personal plans for students' future learning and work (Allen, Hogan, & Steinberg, 1998). Together, these principles embody practices associated with authentic pedagogies, integrated content, and academic self-regulation.

Drawing on these reform principles, Steinberg (1997) proposed six components to guide task design, as shown in Table 3.1 below.

Table 3.1

Components of the 6 A's Framework

Component	Description	Correlation to Instructional Core for 21st Century Learning
Academic rigor	Addresses school-based learning standards and habits of mind and work associated with academic and professional disciplines	Integrated Curriculum
Authenticity	Situates learning in real-world settings such as the community or workplace, and addresses issues that both matter to students and are taken seriously by adults	Authentic Pedagogies
Applied learning	Engages students in solving semi-structured problems with workplace competencies such as teamwork, problem-solving, and collaboration	Authentic Pedagogies, Integrated Curriculum
Active exploration	Extends student learning beyond the classroom to include field investigations and community-based experiences	Authentic Pedagogies, Academic Self-Regulation
Adult connections	Includes supportive relationships between students and mentors from the community	Authentic Pedagogies, Academic Self-Regulation

Assessment	Engages students in public sharing and self-assessment of their work, and evaluates outcomes in relation to real-world performance standards	Integrated Curriculum, Academic Self-Regulation

(Allen et al., 1998; Steinberg, 1997)

The components of the 6 A's Framework reflect the elements of an instructional core for 21st century learning: authentic pedagogies, integrated content, and academic self-regulation. For example, the framework reflects authentic pedagogies through the component of Authenticity, which promotes learning in authentic contexts and examining issues of real-world or personal relevance for students. Similarly, Applied Learning and Active Exploration call for students to apply their learning to understand challenging real-world problems and engage with learning environments outside the classroom. Each of these components evokes authentic pedagogy standards such as higher-order thinking and connectedness to the world (Newmann & Wehlage, 1993). Together, the components also reflect the real-world contexts embedded in authentic pedagogy models such as project-based learning, simulation, and service learning (Bell, 2010; Billing, 2000).

Additionally, the 6 A's Framework reflects integrated curricular content (Brazee & Capelluti, 1995; Drake, 2007). Academic Rigor calls for rigorous proficiency standards from both academic and professional contexts, assigning equal importance to traditional academic standards and real-world outcomes (Van de Oudeweetering & Voogt, 2018). Further, Applied Learning involves the application of 21st century competencies such as collaboration to solve authentic problems (Meriläinen & Piispanen, 2013). Finally, Assessment addresses professional performance standards that are transdisciplinary in nature and not tied to specific academic content areas. These components of the framework suggest an integrated curricular approach that considers real-world topics and themes using concepts, skills, tools, and performance standards

from diverse academic disciplines and professional realms (Brazee & Capelluti, 1995; Drake, 2007).

Finally, the framework supports academic self-regulation. Adult Connections promotes students' relationships with, and accountability to, mentors outside the classroom. Through these adult connections, students interact with adults who may model or scaffold self-regulation strategies (Boekaerts & Corno, 2005; Zimmerman, 1989) or provide feedback on students' thinking, self-regulation, or performance (Cooper et al., 2005; Sierens, Vansteenkiste, Goossens, Soenens, & Dochy, 2009). Likewise, Active Exploration makes students responsible for extending their learning outside of the classroom, requiring a level of autonomy that may both demand and deepen self-regulation strategies (Sierens et al., 2009). Finally, Assessment requires that students reflect on, take ownership for, and share their new learning with others. These processes may increase students' interest in and persistence toward the learning process (Pintrich & De Groot, 1990), improve self-management (Pintrich & Zusho, 2002), and build communication skills (Butler, 2002). Thus, the framework supports students' development of self-regulation competencies to more deeply engage in 21st century learning.

Though no empirical studies have tested the effectiveness or impact of the 6 A's Framework, limited research (Eisenman, Hill, Bailey, & Dickison, 2003) has examined the outcomes of broader school-to-work reforms. Notably, this research focuses almost exclusively on the implementation of school-to-work reforms in high school and post-secondary contexts, rather than in middle schools. However, the framework supports each component of an instructional core for 21st century learning and meets the needs of CCA's teachers. It integrates strands of instructional practice, such as the use of PBL, with which teachers at CCA are familiar and builds on their efficacy for instruction by promoting innovative pedagogies. The framework

further allows teachers to address both academic standards and 21st century skills so they do not feel compelled to sacrifice one for the other. Finally, the 6 A's Framework incorporates components that support student self-regulation, an area that CCA teachers identified as a weakness among students and an area of need to support classroom management and engagement.

This intervention study will test the effectiveness of the 6 A's Framework for teaching 21st century skills at the middle school level. Implementing the new framework will require a change in teacher practice, supported by increases in teacher knowledge and efficacy. Therefore, a second component of the intervention study involves the process by which teachers will develop knowledge and efficacy in relation to the new framework. Components of this professional learning process are discussed in the sections that follow.

Intervention Process: Conceptual and Theoretical Frameworks

Before teachers can implement an educational reform such as adopting a task design framework for 21st century learning, they must understand the reform, know how to implement it, and have access to the resources necessary to implement it; often, these changes in practice require professional learning that promotes changes in teacher knowledge, beliefs, and behaviors (Guskey, 2002; Tschannen-Moran & Chen, 2014). Although definitions of effective professional learning vary (Guskey, 2003), positive professional learning outcomes have been widely documented: effective professional learning experiences can increase teacher confidence for new instructional approaches (Beriswill, Bracey, Sherman-Morris, Huang & Lee, 2016), reduce anxiety for teaching new content and skills (Lambert & Gong, 2010), increase teachers' motivation for implementing new practices (Tschannen-Moran & Chen, 2014) and strengthen the quality of teaching and learning (Garet, Porter, Desimone, Birman, & Yoon, 2001; Lambert &

Gong, 2010; Lowenstein, Martusewicz, & Voelker, 2010). This section reviews two frameworks, the P21 Support Systems Framework (Partnership for 21st Century Learning, 2015) and teacher efficacy theory, to guide a review of literature on professional learning approaches.

P21 Framework

In its P21 Support Systems Framework, the Partnership for 21st Century Learning (2015) recommends four criteria for effective professional learning related to 21st century skills. Such learning: (1) is scalable and sustainable; (2) provides specific tools and/or helps teachers develop strategies to support 21st century skill integration; (3) illustrates the correlation between deep understanding of content and 21st century skills; and (4) facilitates knowledge sharing among practitioners. These criteria reflect broader principles of effective professional learning and are discussed in further detail below.

Scalable and Sustainable

Sustained professional learning models are more likely than stand-alone or intermittent learning experiences to change teacher practice (Darling-Hammond, Hyler, & Gardner, 2017). Learning that occurs through extended contact hours over a prolonged rather than condensed period of time is one component of a sustainable model. Professional learning experiences progressing over a longer term offer teachers time to acquire, reflect on, apply, and refine new learning (Garet et al., 2001; Opfer & Pedder, 2011). Although contact time alone is not sufficient to improve professional learning, when used in combination with other factors, it can have "substantial, though indirect, effects" (Ingvarson, Meiers, & Beavis, 2005, p. 15) on teacher learning outcomes.

Like time, coherence, or the consistency of professional learning with the teaching and learning context, individuals' beliefs and attitudes, along with district or state policy priorities

(Dagen & Bean, 2014; Garet, et al., 2001), can support sustainable and scalable professional learning. In his work on the evaluation of teacher professional development, Killion (2008) maintained that teachers were more likely to change their practice when they understood the relevance of new learning and its connection to other professional objectives. One approach to increasing this coherence, or relevance, is to engage teachers in active learning that is grounded in their daily classroom practice. Job-embedded experiences that involve teachers in writing shared curricula, co-planning lessons, discussing instruction, designing strategies, and participating in study groups on context-specific problems of practice, can enhance the sustainability and scalability of professional learning designs (Blank & de las Alas, 2009; Darling-Hammond et al., 2017; Desimone & Garet, 2015; Garet et al., 2001; Zepeda, 2008).

An example of such a job-embedded design is 21st Century Learning Design (21CLD), a global professional development program to help teachers create learning activities that develop 21st century learning competencies (Shear, Gallagher, & Patel, 2011). Through 21CLD, teachers examine rubrics measuring six 21st century competencies: collaboration, communication, knowledge construction, self-regulation, real-world problem solving, and use of information and communications technology. Over a series of sessions—the number of which may vary according to teachers' needs—participants use the rubrics to evaluate existing learning activities or lessons, then revise each activity or lesson to improve its alignment with the rubric. The program was tested over the course of a year in nearly 200 schools in seven countries, involving approximately 4,000 teachers and 200 school leaders. Teachers in the study primarily taught the equivalent of middle school, with their students generally between 11 and 14 years old. According to survey data, programs that were enacted over a period of time, included hand-on activities, and involved practicing teaching methods and conducting research rather than

observing demonstrations or listening to lectures, correlated with teachers' use of innovative practices to support 21st century learning (Shear et al., 2011). This model illustrates the power of sustained, active, job-embedded professional learning to strengthen teachers' integration of 21st century skills in the classroom. As discussed in the next section, the model may also have been successful because it provided teachers with specific tools—in this case, rubrics—to support their learning and practice.

Specific Tools and Strategies

Effective professional learning must not only be sustainable and scalable, it must also equip teachers with the tools and strategies they needed to implement new practices (Tschannen-Moran & Chen, 2014). Without this practical knowledge, teachers can feel anxious and resistant when confronting expectations for change (Weissblueth, Nissim, & Amar, 2014). Therefore, teaching 21st century skills requires professional learning that helps teachers access, understand, and utilize specific tools and strategies to support 21st century learning (Soulé & Warrick, 2015). To this end, Hixson, Ravitz, and Whisman (2012) studied the impact of professional learning about one instructional strategy, project-based learning, on teachers' ability to teach and assess 21st century skills. In this two-year study, a sample of K-12 teachers in West Virginia received one week of training in project-based learning. A survey of 42 teachers who received this training, and a comparison group of 42 teachers who did not receive the training, showed substantial and statistically significant effect size differences: teachers who participated in the training taught 21st century skills more frequently and in a more integrated manner than those who did not. This outcome remained consistent across content areas, student ability levels, and school contexts, suggesting that learning a specific strategy that supports 21st century learning directly contributed to changes in teachers' practice.

Importantly, the most effective professional learning may not end with teachers' learning about new tools or strategies. According to Guskey (2002), "It is not the professional development per se, but the experience of successful implementation that changes teachers' attitudes and beliefs. They believe it works because they have seen it work, and that experience shapes their attitudes and beliefs" (p. 383). As teachers engage in professional learning and ultimately implement strategies in their own classrooms, they can directly observe the impact on student learning and make context-specific adjustments to maximize results (Raphael, Vasquez, Fortune, Gavelek, & Au, 2014). When teachers perceive that the impact on student learning is positive, their sense of efficacy and motivation for using new strategies can grow. Berman et al. (1977) found that teachers' sense of personal teaching efficacy was a "powerful explanatory variable" (p. 73) that had significant positive effects on the degree to which teachers changed their practice and continued using new instructional methods. Therefore, professional learning must extend beyond formal workshops or out-of-classroom learning experiences to include opportunities for teachers to implement new strategies and reflect on the effectiveness of these strategies.

Content and 21st Century Skills

Teaching for 21st century skills demands not only new instructional strategies and tools, but also new ways of thinking about the relationship between traditional academic content and 21st century skills. Several studies from the 1990s and early 2000s tested professional learning models to help teachers integrate academic skills with generic skills, or what would later be termed 21st century skills. In a report that examined skill integration practices among high school teachers, Stasz, Ramsey, Eden, DaVanzo, Farris, and Lewis (1992) concluded that traditional professional learning, which generally focused either on technical processes such as

lesson-planning or schoolwide issues such as state policy, left teachers "unprepared to experiment with mixing domain specific and generic skills" (p. 33). Rather, Stasz et al. (1992) argued, teachers needed "entirely new forms of staff development" (p. 36). The authors proposed summer workplace internships as a professional learning model that would help teachers build relationships with experts in real-world industries and clarify connections between school-based and work-based learning.

Drawing on the findings and recommendations of Stasz et al. (1992), Eisenman et al. (2003) designed a six-week School-to-Work Professional Development Institute. The institute, designed with careful attention to teacher collaboration opportunities, aimed to help teams of secondary teachers design, implement, and evaluate integrated academic and occupational learning tasks. Lessons at the institute addressed integrated teaching and assessment practices through readings, case studies, and discussions. Participants were also required to take part in a community-based externship. To apply their new learning and experience, teachers worked in interdisciplinary teams to design curriculum units based on workplace problems or issues that would address both academic and generic skills. The researchers found that participation in the institute and externship shifted teachers' focus from being primarily academic, to prioritizing real-world skills such as teamwork and collaboration alongside academic content in curriculum and project designs. Moreover, their model affirmed the role of teacher collaboration in supporting professional learning on the integration of academic content and 21st century skills.

Knowledge Sharing

Knowledge sharing through collaboration in a professional context can be a powerful component of teachers' professional learning (Opfer & Pedder, 2011; Raphael et al., 2014; Rohlwing & Spelman, 2014; Youngs & Lane, 2014). In one meta-analysis, Cordingley, Bell,

Rundell, and Evans (2003) reviewed 15 research studies on the impact of collaborative professional learning. The authors concluded that collaboration positively impacted teachers' knowledge of instructional strategies, their ability to address student learning needs, their professional self-esteem and confidence, and their commitment to continued professional learning. Further, Tienken and Stonaker (2007) found that collaboration resulted not only in increases in knowledge and efficacy, but also changes in behavior. They examined the beliefs and practices of teachers in a district that had transitioned from a traditional professional development model to a model based on professional collaboration. Prior to this shift, 58% of teachers reported that new professional learning had caused them to change their instructional practice; after, 86% of teachers reported changing their practice as a result of professional learning experiences. The collaborative model had impacted the knowledge and attitudes of teachers in ways that, according to teachers themselves, transformed their classroom behavior.

These positive outcomes may result, in part, from the sense of safety and validation that teachers derive from working with a team. In a qualitative study of six teachers implementing new standards, Meirink, Meijer, and Verloop (2007) found that collaboration offered cognitive support that promoted instructional change. According to the authors, teachers felt insecure as they experimented with new methods on their own. They sought support and confirmation from colleagues engaged in similar practices, and when they received this, they were more likely to continue using new strategies. As teachers' sense of efficacy grows as a result of collaboration, it can motivate teachers to use and persist in using new learning in the classroom (Bandura, 1982; Gardner, Lally, & Wardle, 2012; Berman et al., 1977; Tschannen-Moran & Chen, 2014).

Teacher Efficacy

Teacher efficacy theory serves as a second framework guiding professional learning in the intervention context. Derived from Bandura's (1977) construct of self-efficacy, which Bandura defined as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3), teacher efficacy refers to "the teacher's belief in his or her capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context" (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998, p. 233). Two dimensions of teacher efficacy, general teaching efficacy and personal teaching efficacy, are differentiated by locus of control: the former, influenced by external factors, represents the degree to which teachers believe students can learn despite external obstacles (Gibson & Dembo, 1984); the latter, influenced by internal factors, represents the degree to which teachers believe they can influence student motivation and achievement (Tschannen-Moran & Woolfolk Hoy, 2001).

This study focuses on personal teaching efficacy and its three dimensions: efficacy for instruction, efficacy for engagement, and efficacy for classroom management. Each dimension may impact practices that facilitate or constrain efforts to teach 21st century skills. Teachers with high efficacy for instruction are more likely to implement new instructional approaches, design student-centered learning tasks, and seek alternate strategies when students do not make adequate progress (Allinder, 1994; Ashton & Webb, 1986; Berman, McLaughlin, Bass, Pauly, & Zellman, 1977; Nie, Tan, Liau, Lau, & Chua, 2012). Likewise, teachers with efficacy for student engagement are more likely to maintain high standards for all students (Ashton & Webb, 1986; Bencze & di Giuseppe, 2006); regard learners as capable of becoming independent, creative thinkers; and encourage engagement through appropriately relevant and rigorous tasks (Ashton

& Webb, 1986). Teachers with high efficacy for classroom management are more likely to offer opportunities for students to take ownership for their learning and to practice competencies such as leadership, communication, and collaboration in the classroom setting (Ashton & Webb, 1986; Woolfolk & Hoy, 1990; Woolfolk, Rosoff, & Hoy, 1990).

Personal teaching efficacy may contribute to stronger domain-specific efficacy (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998), or efficacy for teaching 21st century skills. Like self-efficacy beliefs (Bandura, 1986), teacher efficacy beliefs can influence teacher behavior through the self-regulation of motivation and persistence. In a mixed-methods study of teachers in Ohio, Haney, Czerniak, and Lumpe (1996) evaluated factors that increased teachers' intentions to implement the state's new model of science instruction. The researchers constructed two research instruments, a questionnaire and a structured interview protocol, to assess and correlate teachers' beliefs and intentions. The questionnaire was sent to 800 randomly selected teachers; from this sample, 13 teachers volunteered to participate in the interview. According to the study's quantitative and qualitative findings, teachers with higher efficacy scores held more positive attitudes toward the reforms and were more likely to report they intended to implement the reforms. It follows, then, that higher levels of teaching efficacy may motivate, inspire, and empower teachers to purposefully and systematically apply authentic pedagogies, integrated content, and academic self-regulation strategies in their instructional settings. As these practices reinforce teachers' efficacy for teaching 21st century skills, students may have greater opportunities to engage in learning experiences that integrate these skills.

Three of Bandura's (1977) four sources of efficacy beliefs may contribute to teachers' efficacy beliefs: mastery experiences, vicarious experiences, and verbal persuasion. In a schooling context, mastery experiences refer to perceived successes in instructional practice or

student learning. This source of efficacy has been significantly correlated with increases in efficacy among pre-service and in-service teachers (Morris & Usher, 2011; Tschannen-Moran & Woolfolk Hoy, 2007). Verbal persuasion, generally referring to encouragement or feedback about an individual's ability, can also positively impact teachers' sense of efficacy, particularly when coming from trusted or respected sources such as colleagues and supervisors (Akhavan & Tracz, 2016; Hora & Ferrare, 2012; Tschannen-Moran & McMaster, 2009; Tschannen-Moran & Woolfolk Hoy, 2007). Finally, vicarious experiences, referring to individuals' observation of models who exemplify a targeted competency (Bandura, 1994), can strengthen teacher efficacy by allowing teachers to witness effective practice. In an education setting, vicarious experience appears particularly impactful among novice or pre-service teachers (Hagen et al., 1998).

The professional learning criteria outlined in the P21 Support Systems Framework (Partnership for 21st Century Learning, 2015) align and intersect with these drivers of personal teaching efficacy. Scalable and sustainable learning is generally comprised of active and job-embedded experiences, allowing teachers to develop professional knowledge that supports teachers' efficacy for enacting new instructional practices (Shear et al., 2011). Likewise, providing teachers specific tools, strategies, and approaches to content and skill integration may deepen their knowledge and increase the likelihood that teachers will experience mastery as they apply new knowledge in their own classrooms (Hixson, Ravitz, & Whisman, 2012). Knowledge-sharing may be particularly important for strengthening teacher efficacy, creating opportunities for teachers to collaboratively refine their thinking and practice, learn from others' practice, and receive support or encouragement from colleagues (Cordingley et al., 2003; Eisenman et al., 2003; Mirink et al, 2007). Such verbal persuasion and vicarious experiences within a knowledge-

sharing context may increase teachers' confidence in their capacity to effectively integrate 21st century skills into student learning tasks.

Professional Learning

Given the need for a systematic, cohesive approach to teaching and learning 21st century skills, professional learning models that foster active and job-embedded learning, build knowledge specific instructional strategies and content, and promote knowledge-sharing (Partnership for 21st Century Learning, 2015) must be considered. Effective models should empower teachers within the research context to deepen their knowledge of approaches to integrating 21st century skills for their students, while also strengthening teachers' sense of efficacy for teaching 21st century skills by providing opportunities for mastery experiences, verbal persuasion, and vicarious experiences (Bandura, 1977). A collaborative approach to professional learning may best address these requirements. Three collaborative professional learning models—personal learning networks, professional learning communities, and communities of practice—are discussed below.

Collaborative Models

One model of collaborative learning, the professional learning network, is a "network of people, information, and resources that an individual strategically develops using social technologies to access informal learning" (Oddone, Hughes, & Lupton, 2019, p. 104). A professional learning network is formed when groups of professionals, who may not occupy the same physical space, leverage technology to pursue individual professional goals with others who share similar interests. The learning that results in this online context is both active and self-directed (Oddone et al., 2019). In a qualitative collective case study, Oddone et al. (2019) interviewed 13 elementary and secondary teachers who had used professional learning networks

across several international sites. The researchers' semi-structured interview questions probed how teachers used social technology to facilitate and deepen professional learning. They found that three specific practices contributed to positive experiences: (1) linking, or connecting with people and resources to meet professional learning goals; (2) stretching, or discovering new ideas and expanding the learning network; and (3) amplifying, or actively contributing to new knowledge, co-constructing knowledge, or redistributing information and resources. For teachers who engaged in these practices, Oddone et al. (2019) found several positive outcomes: teachers improved their knowledge and implemented new skills, developed a stronger sense of self-confidence, accessed high-quality information, and shared their own expertise on a broad scale.

A second model, professional learning communities, is derived from Senge's (2006) concept of learning organizations. In DuFour and Eaker's (1998) conceptualization of this model, all teachers in a school are members of a school-based professional learning community and work in collaborative teams to advance the work of the school. The teams are results-oriented, generally striving to improve specific instructional practices or student learning outcomes (Blankenship & Ruona, 2007) through a disciplined inquiry process. In a case study of one professional learning community comprised of three pre-school teachers, Damjanovic and Blank (2018) observed nine professional learning community meetings, collected student work samples shared during the meetings, and interviewed each participant. The researchers found that as teachers collectively reviewed student work, they became more comfortable raising questions and identifying problems of practice, and their thinking about students' capacity and their own instruction began to shift. However, Damjanovic and Blank acknowledged this change was measured at best, writing, "the romanticized notion of [professional learning communities] as a collective effort to engage in inquiry and construct local knowledge in order to transform

practice wasn't evident in these teachers' experience" (p. 574). Although teachers followed the external mandate to collaborate around student work, they had not internalized the collaborative process as a means of deepening their own professional learning.

P21 Framework

Professional learning networks and professional learning communities could potentially support aspects of the P21 professional learning criteria (Partnership for 21st Century Learning, 2015). Professional learning networks may allow teachers to access professionals' expertise on specific strategies to support 21st century learning, without being limited to the knowledge of colleagues in their physical proximity. However, this model may not be easily scalable or sustainable, depending entirely on the existence and continued participation of individuals within the network. Moreover, professional learning networks may not yield the shared responsibility, professional integration, and coherence that can result when teachers in the same professional context pursue common goals and outcomes for a shared group of students (Dagen & Bean, 2014; Fullan, 2000; Killion, 2008). In contrast, professional learning communities can provide these benefits, enabling teachers in a given context to collaborate on collective goals or student learning outcomes. This model's disciplined inquiry approach is scalable and sustainable, and it may support teachers in identifying problems and new strategies (Damjanovic & Blank, 2018). However, the means by which teachers share diverse expertise and jointly construct new learning are unclear in a professional learning community model (Blankenship & Ruona, 2007). As such, neither professional learning networks nor professional learning communities may be ideal for supporting professional learning for 21st century skills based on a systematic, cohesive approach to school change.

Teacher Efficacy

Features of both collaborative models could contribute to teacher efficacy. Professional learning networks allow teachers to access others' knowledge and experiences without limitations such as geographic proximity. They may therefore provide a source of vicarious experience and verbal persuasion (Bandura, 1977) unavailable to teachers in their own professional contexts. However, research on the correlation between teaching efficacy and online learning environments is limited. General research, largely focused on students in undergraduate and graduate programs, suggests a number of complex mediating factors—including computer self-efficacy and information-seeking self-efficacy—that could potentially undermine the development of teaching efficacy in this professional learning context (Alqurashi, 2016; Bates & Khasawnehb, 2007). Further, although these factors are not a concern in professional learning communities, the emphasis on procedures and results in the professional learning community model may overshadow opportunities for knowledge sharing, verbal persuasion, and vicarious experiences, which are conducive to building teacher efficacy. As such, neither model may maximize teacher efficacy for teaching 21st century skills.

Communities of Practice

Communities of practice represent a third collaborative learning model. In this model, collaboration occurs among "groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger, McDermott, & Snyder, 2002, p. 4). In their case study of one community of practice, Palinscar, Magnusson, Marano, Ford, and Brown (1998) articulated three principles of a community of practice: (1) "The work of our community of practice is the development of teaching practice reflective of a specific orientation to teaching" (p. 7); (2) "Our

community of practice relies upon diverse expertise to contribute to the community's intellectual resources" (p. 8); and (3) "Central to the work of this community of practice is the intellectual activity associated with teaching including planning, enacting, and reflecting upon one's teaching" (p. 10). When these or similar principles are enacted in a professional setting, teachers are provided a context in which to identify problems, share strategies, acquire new knowledge, and propose solutions; in turn, they develop a sense of collective responsibility (Jensen, Sonnemann, Roberts-Hull, & Hunter, 2016; Opfer & Pedder, 2011) and efficacy (Brownell, Yeager, Rennells, & Riley, 1997; Bruce & Flynn, 2012; Shachar & Shmuelevitz, 1997) for improving teaching and learning.

Teachers' collaboration in communities of practice may be especially important when teachers encounter reforms that involve changes to traditional schooling models or curricular designs, or when accountability measures challenge their fundamental beliefs about teaching and learning. In a discussion of school-to-work reforms, Steinberg (1997) suggested that integrating academic skills with work-based skills, or 21st century skills, may raise questions for teachers in terms of "how far to go in abandoning the traditional curriculum" (p. 156). According to Steinberg, the most effective strategy to address such questions is to assemble teams of teachers who could meet regularly to "unearth the reasons behind their current practice, and to reconsider that practice in the light of changing economic and social realities" (p. 156).

Illustrating Steinberg's proposal, Akerson, Cullen, and Hanson (2009) conducted a 12-month study that explored 17 elementary teachers' perspectives on the changing nature of science instruction. The researchers established their community of practice by "meeting regularly over an extended period of time, developing and sharing common values and goals, and engaging in collaboration and critique of each other's work" (p. 1095). The researchers

administered the Views of Nature of Science Questionnaire before and after the intervention, conducted pre- and post-intervention interviews with one-third of the participants, visited the classrooms of 15 teachers at least one time, and collected documents and artifacts related to teachers' implementation of new beliefs and practices. This case study demonstrated that teachers' community of practice provided an environment that supported teacher awareness and reflection in relation to new understandings about the nature of science. In this light, communities of practice may similarly deepen teachers' understanding of 21st century skill integration and facilitate their application of this understanding to practice.

Other studies have found that participation in communities of practice can contribute to teaching efficacy. For example, in study of communities of practice among three mentor teachers and three student teachers in one elementary school, Hawkman, Chval, and Kingsley (2016) found that structured collaboration strengthened student teachers' sense of personal teaching efficacy. Over a two-year period, the researchers interviewed each student teacher at least twice, interviewed each mentor teacher, and conducted at least one field observations in each teaching context. They found that participating in a community of practice enabled veteran teachers to provide: (1) scaffolding to support mastery experiences; (2) feedback, or verbal persuasion; and (3) modeling, or vicarious experiences (Bandura, 1977); collectively, these strategies supported student teachers' feelings of efficacy.

In a study involving more experienced teachers, Takahashi (2011) used a semi-structured interview protocol to investigate the relationship between collaborative decision-making in a community of practice and teachers' sense of personal and collective teaching efficacy. The researcher interviewed four veteran middle school teachers in one school on at least three occasions each over the course of a school year. According to the research findings, as teachers

shared and discussed student data within communities of practice, they took greater ownership for student learning, and in turn, began to "negotiate and co-construct their efficacy beliefs" (p. 740). Richmond and Manokore (2011) similarly evaluated the impact of teachers' collaboration within a community of practice, documenting the content of dialogue that occurred among elementary science teachers within these professional contexts. The researchers were present as participant observers during teachers' two-hour biweekly meetings over the course of a school year. They found that the process of collaborating within communities of practice deepened teachers' resistance to accountability reforms that de-emphasized science content, and also increased teachers' sense of personal obligation to help students learn science. In this case, collaboration empowered teachers to resist external pressures and led to their sense of efficacy as change-makers. For teachers facing accountability reforms that emphasize academic standards over 21st century skills, a community of practice may be a productive context in which to explore beliefs and practices related to integrating both sets of competencies.

P21 Framework

A communities of practice model can support and reinforce the professional learning criteria established in the P21 Framework (Partnership for 21st Century Learning, 2015). It is scalable—operating effectively at the department, grade, school, or district levels—and also sustainable, an active learning process that can be embedded in teachers' daily work (Wenger et al., 2002). Further, communities of practice may serve a site for identifying, applying, reflecting on, and evaluating specific instructional tools and strategies, and for engaging in purposeful dialogue around the challenges and opportunities associated with integrating academic content and 21st century skills (Palinscar et al., 1998; Steinberg, 1997). Importantly, the communities of practice model also prioritizes knowledge sharing, empowering teachers to contribute diverse

expertise as they offer varied perspectives, uncover and challenge assumptions, and collectively construct new learning (Akerson et al., 2009; Steinberg, 1997). Thus, the model meets the criteria outlined by the P21 framework.

Teacher Efficacy

Collaboration through communities of practice can clarify or reinforce teachers' efficacy beliefs in ways that may impact their classroom behavior. Opportunities for verbal persuasion and vicarious experience (Bandura, 1977) in the context of the community of practice may directly contribute to teachers' personal teaching efficacy (Hawkman et al., 2016) and efficacy as change-makers (Richmond & Manokore, 2011) in relation to new teaching approaches. Likewise, the sense of mutual responsibility (Jensen et al., 2016) and shared professional growth emerging from a community of practice may support teachers' collective efficacy for improving student learning outcomes (Takahashi, 2011). Finally, an emphasis on "planning, enacting, and reflecting" (Palinscar et a., 1998) within the community of practice may provide ongoing support for teachers' evolving professional practice, extending opportunities for mastery experiences within a nurturing, collegial environment. As such, the community of practice model may be an effective professional learning context for strengthening teachers' efficacy for teaching 21st century skills.

Interdisciplinary Teams

Interdisciplinary teams may be a particularly useful form of the communities of practice model when designing integrated or transdisciplinary tasks (Brazee & Capelluti, 1995; Drake, 2007) to support an instructional core for 21st century learning. Studies examining the effectiveness of interdisciplinary teams generally suggest benefits to this model of collaboration, though they have focused primarily on higher education as opposed to K-12 schools (Dailey &

Hauschild-Mork, 2017; Paskevicius & Bortolin, 2016; Pharo, Davison, McGregor, Warr, & Brown, 2014). For example, in one study of cross-disciplinary collaboration at the postsecondary level, Borrego and Newswander (2008) interviewed engineering professors who partnered with non-engineering faculty on an interdisciplinary project. Among the 15 partner pairs interviewed using a semi-structured interview protocol, the researchers found that successful partners approached the experience as an opportunity to deepen their own understanding by learning from a colleague in a different discipline. These partners reported a high level of satisfaction with the partnership and considered their product to be of higher quality than projects they had previously developed using a single-discipline approach.

Studies examining the relationship between interdisciplinary teams and teachers' sense of efficacy are limited. In one study, Warren and Payne (1997) investigated the relationship between middle school teachers' personal teaching efficacy and access to common planning time within interdisciplinary teams. While they found that teachers who had common planning time had a higher sense of personal teaching efficacy than those without common planning time, they did not compare teachers who were not on interdisciplinary teams. More recently, in Kodkanon, Pinit, and Murphy's (2018) qualitative study of five high school teachers in Japan, teachers reported that participation on an interdisciplinary team enabled them to share experiences and instructional strategies, offer positive reinforcement and encouragement, and feel more confident. Although the study did not explicitly evaluate changes in teachers' sense of efficacy, these results suggest that interdisciplinary teams may have provided opportunities for vicarious learning and verbal persuasion, both drivers of self-efficacy (Bandura, 1977). There is a need to further investigate the relationship between interdisciplinary teams and teachers' sense of personal teaching efficacy.

P21 Framework

Interdisciplinary teams can support several aspects of the P21 professional learning criteria framework (Partnership for 21st Century Learning (2015). Like communities of practice in general, they are scalable and sustainable, capable of operating at multiple levels within an organization while engaging teachers in active learning grounded in their daily practice. Additionally, the interdisciplinary nature of these teams makes them especially conducive to sharing strategies, tools, and approaches to content-skill integration across disciplinary boundaries, enabling teachers to learn best practices that they may not otherwise encounter within their own disciplines (Borrego & Newswander, 2008). Along similar lines, sharing knowledge across disciplines may offer teachers new instructional perspectives and possibilities; this could potentially facilitate the co-construction of interdisciplinary or transdisciplinary solutions to address the challenges of integrating academic content with 21st century skills (Kodkanon et al., 2018). Organizing teachers in interdisciplinary teams may deepen professional learning in ways that organization based on content areas cannot.

Teacher Efficacy

Accessing colleagues' diverse perspectives and experiences in an interdisciplinary team setting can provide teachers new sources of vicarious experience and verbal persuasion (Bandura, 1977) to which they may not previously have been exposed. Interdisciplinary dialogue and planning may enable teachers to understand what successful practice looks like in other disciplinary contexts, which in turn may help them conceptualize success in their own disciplinary context (Warren & Payne, 1997). Moreover, teachers who believe that products generated through interdisciplinary collaboration are of higher quality (Borrego & Newswander, 2008) may be more likely to feel a sense of mastery, contributing to feelings of personal teaching

efficacy. Utilizing an interdisciplinary teams approach within the community of practice model may further strengthen teachers' efficacy for teaching 21st century skills.

Appreciative Inquiry

Appreciative inquiry may support communities of practice and interdisciplinary teams to achieve their shared purpose. An approach that strives to build "positive potential," appreciative inquiry systematically inquires into a community's strengths and best practices (Cooperrider & Whitney, 2000). Appreciative inquiry includes four steps: (1) Discovery, which involves identifying current effective practices; (2) Dream, which involves building on effective practices to craft a shared vision; (3) Design, which involves planning steps to achieve the vision; and (4) Destiny, which involves committing to the plan and vision (Cooperrider & Whitney, 2000). Through these steps, a professional team identifies and applies learning from previous successes, as opposed to previous challenges or failures, in order to envision the most positive version of the future (Bunshaft, 2018).

Adopting an appreciative inquiry approach within communities of practice offers several benefits for individuals and groups. For example, appreciative inquiry can maximize participants' voices (Bunshaft, 2018) in the change process, which can result in greater individual motivation, flexibility, perseverance, and creativity (Ganjali & Rezaee, 2016). Additionally, the approach can contribute to collaborative and inclusive cultures within organizations (Waters & White, 2015). Kozik, Cooney, Vinciguerra, Gradel, and Black (2009) detail a process in which 35 participants from a range professional backgrounds and perspectives used an appreciative inquiry approach to articulate a shared understanding of instructional practices. Likewise, in a study of an appreciative inquiry initiative that spanned 22 schools in Vancouver, Dickerson and Stevens (2011) found that engaging participants in an appreciative

inquiry process facilitated more widespread collaboration, deeper reflection, a greater understanding of different beliefs, and a clearer systems perspective. Based on interviews conducted with representative from each school, the researchers concluded that as it fostered collaboration, appreciative inquiry could also help to overcome resistance and support a "non-coercive change process" (p. 68) in schools. As these studies suggest, practicing appreciative inquiry within communities of practice may maximize groups' ability to meet their collective goals. However, few studies have directly examined the impact of appreciative inquiry on teacher knowledge and efficacy, leaving this potential correlation open to further study.

Conclusion

Based on the frameworks and literature discussed above, this study proposes an intervention based on Steinberg's (1997) 6 A's Framework for task design. The framework reflects each component of an instructional core (City et al., 2008) for 21st century learning. Teachers at CCA have already begun to explore each component of this instructional core. For example, they have begun to experiment with authentic pedagogical approaches such as project-based learning (Buck Institute of Education, 2018), simulations (Kong et al., 2014), and service learning (Billing, 2000); to define 21st century skills and embed them in curriculum documents (Brazee & Capelluti, 1995; Drake, 2007); and to teach academic self-regulation strategies (Pintrich & De Groot, 1990; Zimmerman, 1998) through advisories and academic courses. However, teachers have not engaged in a task design process to merge these separate strands into a common and coherent instructional framework (Newmann et al., 2001). This study utilizes the 6 A's Framework in an attempt to integrate these strands. Ensuring effective implementation of this framework requires professional learning that is sustained; provides specific tools and strategies; emphasizes connections between academic content and 21st century skills; creates

opportunities for teacher collaboration, interdisciplinary dialogue, and mastery; and builds on teachers' current effective practices.

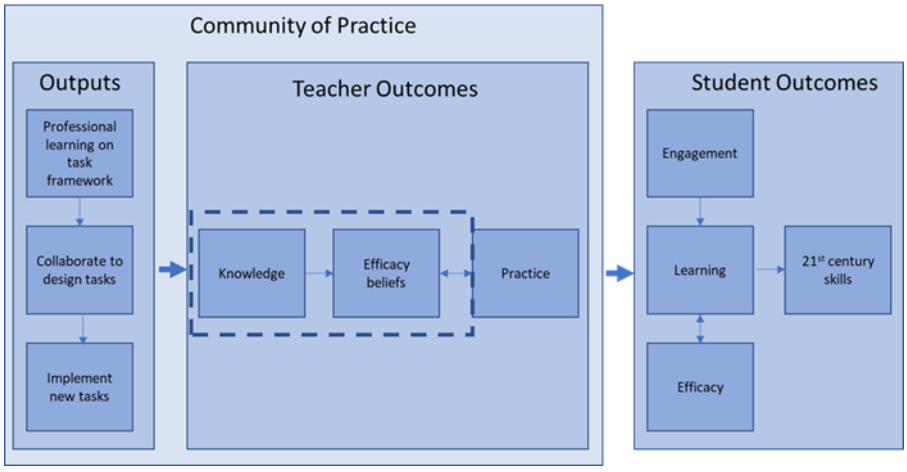
A three-phase intervention was designed (Figure 3.2) to support teachers in learning about and implementing the 6 A's Framework. The original timeline was altered due to an unexpected announcement about the school's closure at the end of the year, and the study itself was amended as a result of the COVID-19 closure in spring 2020. Consequently, only the first phase of the original design was implemented. This phase introduced teachers to the 6 A's Framework. Through an appreciative inquiry process (Copperrider & Whitney, 2000), teachers identified current areas of excellence in relation to the framework and articulate what they individually and collectively need in order to implement the framework at CCA. Next, teachers engaged as a community of practice (Wenger et al., 2002) in a series of five professional learning sessions that addressed these needs while exploring components of the 6 A's Framework (Steinberg, 1997). To support professional learning, sessions were sustained over three months (Darling-Hammond et al., 2017), utilized artifacts from teachers' classroom practice (Desimone & Garet, 2015; Garet et al., 2001; Zepeda, 2008), drew connections between in-school and out-of-school learning (Stasz et al., 1992), and involved dialogue and collaboration through a community of practice model (Palinscar et al.,1998; Wenger et al., 2002).

In the original study design, teachers would next apply their learning of the 6 A's Framework in three to five collaboration sessions. During this second phase of the study, teachers would work in interdisciplinary teams (Borrego & Newswander, 2008) to design at least one original learning task using the 6 A's Framework. It was anticipated that teachers' knowledge would deepen as they discussed new learning as a community of practice in the first phase, and collaborated with their interdisciplinary teams to share insights (Avalos, 2011; Dagen

& Bean, 2014; Rohlwing & Spelman, 2014) and apply new learning (Darling-Hammond et al., 2017; Desimone & Garet, 2015) to design and implement their own tasks in the second and third phases. Professional learning that promotes teacher agency, encourages dialogue, and is situated in relevant contexts can increase teacher knowledge in ways that change teacher practice (Clarke & Hollingsworth, 2002; Jensen et al., 2016; Raphael et al., 2014). Moreover, as teachers engage in relevant, embedded, and collaborative professional learning that builds knowledge and supports new ways of thinking, their sense of efficacy for designing 21st century tasks may grow (Woolfolk Hoy & Davis, 2006).

Figure 3.2

Original Conceptual Framework for Intervention Process



Note. This framework illustrates the relationships among intervention outputs and teacher outcomes within a community of practice, and the relationship between the community of practice and student outcomes.

According to the original design, in the third phase of the study, teams would implement their respective tasks during content classes or the school's daily flex block, a 40-minute period intended—though not used—to support integrated learning experiences. It was anticipated that this stage of the intervention would further increase teachers' domain-specific efficacy, or sense that they can impact student learning in relation to 21st century skills (Gibson & Dembo, 1984;

Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). As teachers collaborated to implement tasks, observed students engage with 21st century skills, and reflected on the experience, they may feel successful; as a result of this mastery experience (Bandura, 1977), their efficacy was expected to grow (Guskey, 1985; Guskey, 2002; Tschannen-Moran & McMaster, 2009). In turn, this efficacy was predicted to motivate teachers to persist in using new task design strategies over time (Bandura, 1982; Berman, et al., 1977; Gardner et al., 2012; Tschannen-Moran & Chen, 2014).

Chapter 4: Intervention Methods

As the needs assessment and intervention literature have indicated, while teachers believe that 21st century skills are essential for student success, improving student learning in these competencies requires attention to multiple aspects of an instructional core (City et al., 2009) for 21st century learning. These aspects—authentic pedagogies, integrated content, and academic self-regulation—must coalesce around an academic task. The 6 A's Framework (Steinberg, 1997) is proposed as a task design framework that reflects each aspect of an instructional core for 21st century learning.

Teachers at CCA had previously begun to explore each aspect of this instructional core. For example, they had experimented with authentic pedagogical approaches such as project-based learning (Buck Institute of Education, 2018), simulations (Kong et al., 2014), and service learning (Billing, 2000); explored integrated curriculum approaches (Brazee & Capelluti, 1995; Drake, 2007); and taught academic self-regulation strategies (Pintrich & De Groot, 1990; Zimmerman, 1998). However, teachers had not engaged in a task design process to merge these separate strands into a common and coherent instructional framework (Newmann et al., 2001). The present intervention used the 6 A's Framework in an attempt to integrate these strands in order to support a systematic approach to teaching 21st century skills.

Purpose of Study

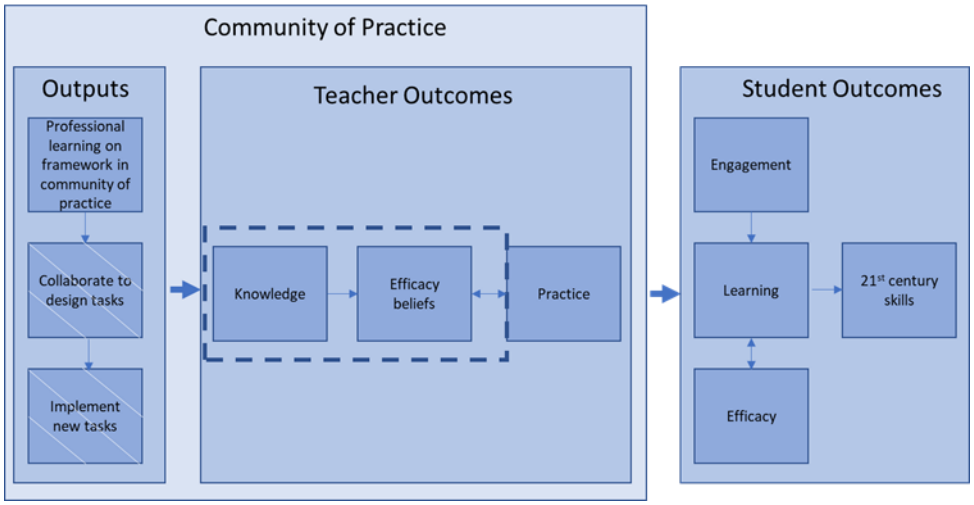
The purpose of this study was to increase teachers' knowledge and self-efficacy for teaching 21st century skills. In order to realize substantive and sustainable instructional change, teachers must develop the pedagogical knowledge necessary to implement the change (Desimone & Stuckey, 2014). Moreover, teachers must possess not only knowledge, but also the belief that the change will improve student learning outcomes, the motivation to initially change their

practice, and the perseverance to persist in implementing changes despite challenges (Calvert, 2016; Tschannen-Moran & Chen, 2014). The needs assessment conducted at CCA indicated that teachers did not know how to integrate 21st century skills with academic content. Further, while they reported feeling confident in their ability to teach a number of specific 21st century skills, this confidence was not reflected in a task analysis that assessed teachers' current practices.

In response to this need, the present intervention aimed to support teacher knowledge by offering an approach to task design that integrates 21st century skills with academic content, while also reflecting the tenets of an instructional core for 21st century learning. The original intervention design also sought to support teacher efficacy through collaborative learning promoting verbal persuasion and vicarious learning, as well as through opportunities for teachers to implement new learning and experience successful classroom performance (Bandura, 1977). A conceptual framework for this intervention is provided in Figure 4.1.

Figure 4.1

Amended Conceptual Framework



Note. This framework illustrates the relationships among intervention outputs and teacher outcomes within a community of practice, and the relationship between the community of practice and student outcomes. Shaded outputs were planned as part of the original study, but not implemented due to the COVID-19 closure.

Importantly, two unanticipated announcements altered the course of study implementation. In late January 2020, the district announced that the school would permanently close in June 2020 due to budget challenges and facility concerns. The program would move to another region in the state, and although some staff would be able to join the new program, others would not. In light of this announcement, the researcher delayed the timeframe for implementing the study. Approximately six weeks later, the school district announced that all schools, including CCA, would be closed due to the COVID-19 crisis until further notice; it was later announced that schools would remain closed and transition to distance learning for the remainder of the academic year. Given this development, the researcher amended the study to include only the first phase of implementation involving professional learning. This chapter details the study as it was implemented, while also noting deviations from the original design.

Research Questions

This study included two types of research questions, outcome evaluation questions and process evaluation questions. Outcome evaluation questions guide the measurement of a research study's outcomes, an intervention's performance, or "the kinds of results that a program is intended to produce" (Newcomer, Hatry, & Wholey, 2015, p. 111). In contrast, process evaluation questions allow a researcher to assess the implementation of a study, intervention, or program. This assessment can support formative adjustments to improve implementation, strengthen intervention outcomes, and interpret outcome evaluation results (Baranowski & Stables, 2000).

The original study included six research questions, shown in Table 4.1. Three questions were related to outcome evaluation, while the other three examined process evaluation. However, due to the amended study design, which did not include task development or

implementation, only one process evaluation question—PEQ1—Were professional learning activities implemented as planned?—was applied to the final study.

Table 4.1

Research Questions, Evaluation Types, and Implementation in Amended Study

Research Question	Type of Evaluation	Implemented in Amended Study?
OEQ1. To what extent did professional learning on the 6A's Framework alter teachers' knowledge, if at all, of how to teach 21st century skills?	Outcome evaluation	Yes
OEQ2. To what extent did teachers' professional learning on the 6A's Framework alter teachers' efficacy, if at all, for teaching 21st century skills?	Outcome evaluation	Yes
OEQ3. To what extent did teachers' collaboration in a community of practice impact their teaching efficacy?	Outcome evaluation	Yes
PEQ1. Were professional learning activities implemented as planned?	Process evaluation	Yes
PEQ2. Did learning tasks reflect components of the 6 A's Framework?	Process evaluation	No
PEQ3. Were learning tasks implemented as designed?	Process evaluation	No

Research Design

The following sections outline the research design of the outcome and process evaluations, including both the original design and the design as implemented. These sections also detail the logic model that informs the design of the outcome and process evaluations.

Outcome Evaluation Design

The outcome evaluation used a convergent parallel mixed-methods design (Creswell & Plano Clark, 2018). This design, grounded in a pragmatic research paradigm (Mertens, 2018), allowed for independent examination of each evaluation question and a richer data set to inform broader research questions. Quantitative and qualitative data, each of equal weight, were concurrently collected, independently analyzed, and converged during interpretation. The purpose of this approach was to develop a more complete understanding of the research problem (Creswell & Plano Clark, 2018), which aimed to improve students' opportunities to develop 21st century skills. The results of this design offered a deeper understanding of the problem than one method alone.

This research design presented strengths and limitations. Among its strengths, the design allowed for a shorter data collection period, as quantitative and qualitative components occurred concurrently (Creswell & Plano Clark, 2018). In contrast, explanatory or exploratory sequential designs would have required more time, as results of one component inform the design of the other (Creswell & Plano Clark, 2018). The convergent parallel design was also suitable for this study's small, purposive sample. While an exploratory sequential design may not permit identification of a quantitative sample until after qualitative data are analyzed, this design allowed all samples to be decided at the outset. Further, samples for both data sets shared the same source, reducing concerns that may arise when one sample is larger than another (Creswell & Plano Clark, 2018). The small sample was particularly appropriate and manageable for the qualitative component.

Process Evaluation Design

The process evaluation, as implemented, examined one component of process evaluation: fidelity of implementation. More specifically, it evaluated adherence to program design, measuring the degree to which intervention activities were implemented as intended (Dusenbury, Brannigan, Falco, & Hansen, 2003). Had the intervention been fully implemented as designed, the process evaluation would also have measured the degree to which participants used or applied the knowledge, programs, or services offered in the intervention (Baranowski & Stables, 2000). A task feedback tool would have enabled the researcher to evaluate the degree to which original learning tasks integrated components of the 6 A's Framework, while a teacher implementation log would have provided documentation on the extent to which participants implemented the tasks as designed.

Treatment Theory and Logic Model

The research design was grounded in a treatment theory that articulates the process by which an intervention may impact a population (Leviton & Lipsey, 2007). Self-efficacy theory (Bandura, 1977) and teacher efficacy theory (Gibson & Dembo, 1984; Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998) informed the treatment theory. Providing students with opportunities to build 21st century skills demands changes in teacher knowledge, which can influence changes in teacher efficacy and ultimately change teacher practice. The intervention involved professional learning and collaboration vis-à-vis a new task framework. Given that more contact hours over more time is more likely to change teacher practice (Darling-Hammond et al., 2017; Garet et al., 2001), this intervention involved five one-hour learning sessions. The original design also included three one-hour collaboration sessions, an additional three-hour collaboration session, and up to five hours of classroom implementation time.

A causal diagram (Leviton & Lipsey, 2007) illustrates how this intervention may impact teacher knowledge, efficacy, and practice to produce desired outcomes (Appendix E). In each learning session, teachers examined components of the task framework and learned strategies to address these components. The intervention was intended to help teachers deepen their knowledge as they collaborated to share insights (Avalos, 2011; Dagen & Bean, 2014; Rohlwing & Spelman, 2014). If not for the school closure, teachers would also have applied their new learning (Darling-Hammond et al., 2017; Desimone & Garet, 2015) to design original tasks using the framework. Professional learning that promotes agency, encourages dialogue, and is situated in relevant contexts can effectively change teacher practice (Clarke & Hollingsworth, 2002; Jensen et al., 2016; Raphael et al., & Au, 2014), ultimately supporting the creation of new tasks.

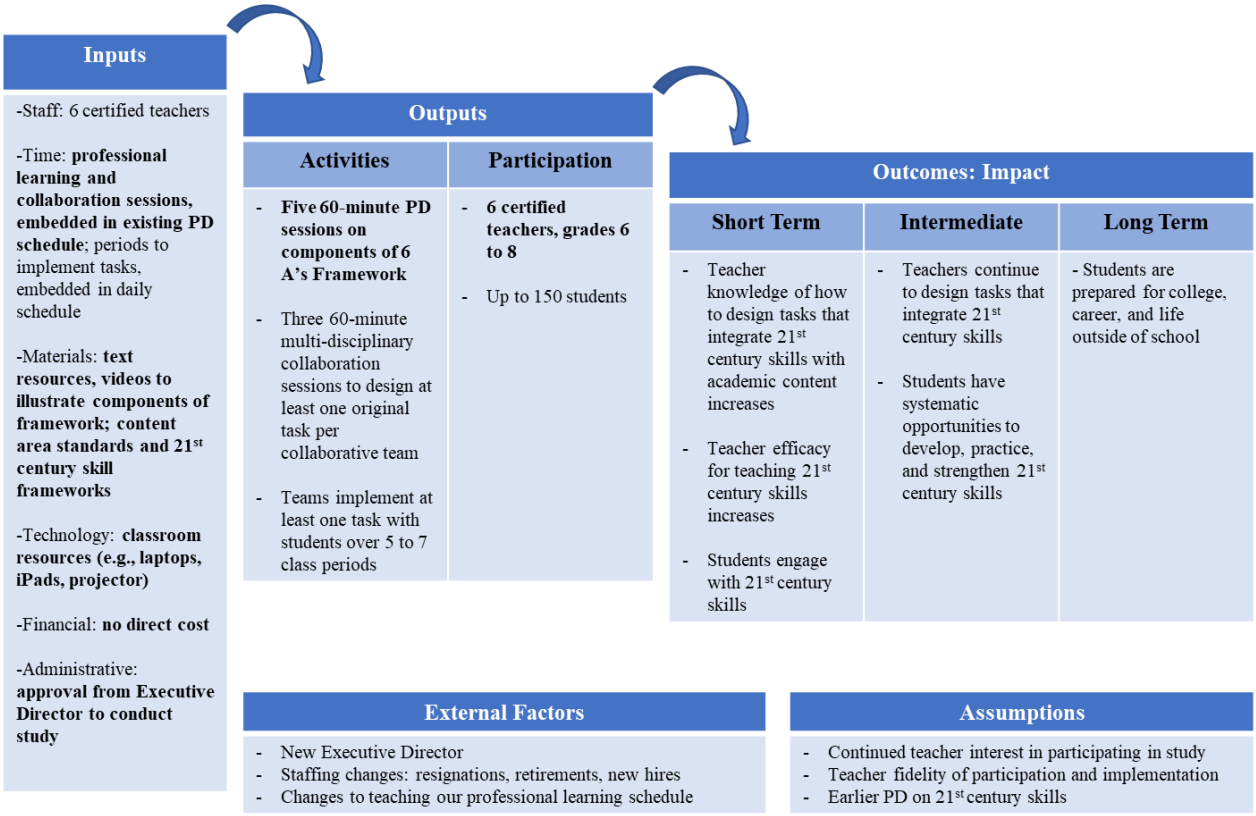
The intervention was also intended to increase teachers' efficacy, or belief that they can affect student learning (Gibson & Dembo, 1984; Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). According to the causal diagram, the act of collaboration itself can increase efficacy, operating through the self-efficacy levers of verbal persuasion and vicarious experience (Bandura, 1979; Brownell et al., 1997; Bruce & Flynn, 2012; Shachar & Shmuelevitz, 1997). Further, according the original study design, as teachers implement tasks and observe students engage with 21st century skills, they may feel successful (Bandura, 1977) and their efficacy may grow as a result of mastery experiences (Guskey, 1985; Guskey, 2002; Tschannen-Moran & McMaster, 2009). A stronger sense of personal teaching efficacy may motivate teachers to persist in using new task design strategies (Bandura, 1982; Gardner et al., 2012; Tschannen-Moran & Chen, 2014). Over time, students' increasing access to tasks that integrate 21st century skills may improve their opportunity to strengthen these skills.

A logic model for the original intervention design (Figure 4.2), grounded in the treatment theory, details intervention inputs, activities, participants, outputs, and outcomes (McLaughlin & Jordan, 1999). Activities designed to effect change included five one-hour learning sessions on components of 6A's Framework. Sessions were sustained and cumulative (Darling-Hammond et al., 2017; Desimone & Garet, 2015), occurring during professional learning time that was integrated into the teacher workday (Learning Forward, 2011). Had the school remained open following these professional learning sessions, teachers would have been assigned to interdisciplinary teams to discuss and apply learning to design an original task (Avalos, 2011; Dagen & Bean, 2014; Darling-Hammond et al., 2017; Desimone & Garet, 2015; Rohlwing & Spelman, 2014) over three one-hour collaboration sessions and an additional three-hour session. Teams would have also implemented tasks with students over five to seven class periods.

Anticipated short-term outcomes of the intervention, as originally designed, included increases in teacher knowledge (Clarke & Hollingsworth, 2002; Jensen et al., 2016; Raphael et al., 2014), student engagement with 21st century skills, and teacher efficacy (Brownell et al., 1997; Bruce & Flynn, 2012; Guskey, 1985; Guskey, 2002; Tschannen-Moran & McMaster, 2009). The short-term outcomes of the amended study included increases in teacher knowledge and teacher efficacy. As a result of increased efficacy, the logic model predicted that teachers would continue to design tasks that integrate 21st century skills (Bandura, 1982; Gardner et al., 2012), creating more opportunities for students to develop and practice 21st century skills. As a long-term outcome, students would be better prepared for life in the 21st century (Eng, 2012).

Figure 4.2

Logic Model



Note. The logic model illustrates relationships among inputs, outputs, and anticipated outcomes. Bold font indicates components of the original study design that were implemented in the amended study.

Methods

A combination of quantitative and qualitative instruments, data collection methods, and data analysis methods were used in this study. An overview of these instruments and methods, along with a discussion of the participant sample, is provided below.

Participants

The participant population included 14 certified teachers at one middle school, the Culture and Communications Academy (CCA), in the northeastern United States. Teachers in this population had a mean of seven years of experience (range: one to 27 years) and nine

content specializations. Recruiting the full population, or a sample close to it, avoids sampling error (Dillman, Tortora, & Bowker, 1999) and may more accurately depict knowledge, efficacy beliefs, and practices across the research context. Thus, all teachers were invited to join the study. Participants were recruited via e-mail. To avoid threats of coercion given that the researcher is also teachers' supervisor and evaluator, an initial e-mail came from the district's Director of Curriculum and Instruction. A follow-up e-mail with information on how to enroll in the study came from the researcher.

Ten of the 14 certified teachers volunteered for the original study. They completed the pre-intervention survey and participated in five professional learning sessions. When the amended study was implemented due to the COVID-19 closure, six of the original 10 participants remained in the study. Pre-intervention questionnaire and survey data for the four teachers who left the study were discarded; only the data for the six teachers who remained were used in data analysis. Six teachers participated in individual interviews as part of the amended study design, and five of the six responded to pre- and post-intervention questionnaires and surveys (Table 4.2).

Table 4.2

Participants in Original and Amended Study

	Original Study	Amended Study
Number of Total Participants	10	6
Number Participating in Pre- and Post-Intervention Questionnaire and Survey	10	5
Number Participating in Interview	N/A	6

Teachers in the amended study sample of six teachers had a range of one to 26 years of teaching experience, with a mean of just over nine years of experience—numbers consistent with the total school population. Five participants were certified teachers, and one was a certified school counselor with classroom teaching responsibilities and a developmental guidance curriculum. The sample represented five content areas: math, science, English-language arts, physical education, and developmental guidance. Four of the six teachers had participated in the needs assessment at CCA two years earlier.

Outcome Evaluation Instrumentation

Four instruments were originally intended to assess teacher knowledge, efficacy, and practice as part of the outcome evaluation. These included (1) a pre- and post-intervention questionnaire (Appendix F), (2) a collaboration reflection log (Appendix G), (3) a pre- and post-intervention teacher efficacy survey (Appendix H), and (4) a focus group protocol (Appendix I). In the amended study design, three instruments were used: (1) a pre-and post-intervention questionnaire, (2) a pre- and post-intervention teacher efficacy survey, and (3) an individual interview protocol. The instruments used in the amended study are detailed below. Table 4.3 compares outcome evaluation instruments used in the original study design and the amended study design.

Table 4.3

Comparison of Outcome Evaluation Instruments Proposed and Implemented in Original and Amended Studies

Instrument	Proposed in Original Study?	Implemented in Amended Study?
Pre- and Post-Intervention Questionnaire	Yes	Yes
Pre- and Post-Intervention Teacher Efficacy Survey	Yes	Yes
Collaboration Reflection Log	Yes	No

Focus Group Protocol	Yes	No
Individual Interview Protocol	No	Yes

Pre- and Post-Intervention Questionnaire

A researcher-created questionnaire (Appendix F), completed before and after the intervention, was designed to measure changes in teachers' self-reported knowledge of task design components and strategies that support 21st century learning. The questionnaire included five closed- and open-ended questions. Questions included Likert-scale prompts such as, *I know specific strategies that can help me integrate 21st century skills into student learning tasks,* as well as open-ended questions that ask for examples of tasks or strategies to exemplify components of the task design framework.

Pre- and Post-Intervention Efficacy Survey

An efficacy survey (Appendix H), completed before and after the intervention, was designed to measure changes in teachers' personal and general efficacy for teaching 21st century skills. It included 21 items adapted from a validated measure, the Science Teachers' Efficacy Belief Instrument (Enochs & Riggs, 1990). For the purpose of this study, items substituted *21st century skills* in place of *science*. For example, whereas the original survey included prompts such as *I generally teach science ineffectively*, the adapted survey included items such as, *I generally teach 21st century skills ineffectively*. To reflect the original instrument, the adapted instrument asked teachers to rate their agreement using a 5-point scale: *strongly disagree, disagree, uncertain, agree, strongly agree*.

The researcher conducted cognitive interviews with two secondary teachers prior to the intervention in order to understand how participants might interpret survey items. These

interviews indicated a need to make minor wording revisions beyond substituting the phrase *21st century skills* in four of the adapted items. For example, the teachers who participated in the cognitive interviews agreed that the original phrase *turn students on to 21st century skills* was confusing; therefore, the researcher replaced this with the phrase, *excite students about 21st century skills*. Similarly, both teachers challenged the word *wonder* in the item, *I wonder if I have the necessary skills….* The researcher changed this wording to, *I question whether I have the necessary skills…* in order to reduce the likelihood for misinterpretation among research participants.

Individual Interview

A semi-structured individual interview protocol (Appendix J) was designed to evaluate teachers' sense of efficacy for teaching 21st century skills after participating in the intervention. This interview protocol was not part of the original study design, and replaced the focus group protocol designed below. It was introduced to collect deeper and richer qualitative feedback from teachers when the number of participants was reduced from ten to six, and when the full scope of the original intervention design could not be implemented. Eight researcher-designed questions were informed, in part, by quantitative items from Tschannen-Moran and Woolfolk Hoy's (2001) Teacher Sense of Efficacy Scale (TSES). Examples of TSES item and interview question correlations are given in Table 4.4.

Table 4.4

TSES and Interview Question Correlation

TSES Item	Interview Question
To what extent can you craft good questions for your students?	To what extent could you use the 6 A's Framework to design an effective task? What might be an example of such a task?

How much can you do to motivate students who show low interest in school work?	How, if at all, could a task designed using this framework have helped you engage and motivate students to take ownership for their learning?
How much can you do to control disruptive behavior in the classroom?	How, if at all, could a task designed using this framework have helped you to minimize behavioral disruptions?

Collaboration Reflection Log

In the original study design, the teacher collaboration reflection log (Appendix G) evaluated teachers' experiences within interdisciplinary teams to determine if these experiences impacted teachers' sense of efficacy for teaching 21st century skills. The tool asked teachers to comment on team outcomes, challenges, new learning or perspectives, and changes in self-efficacy after each collaboration session. Sample questions included, *Did your teammates offer examples from their own professional experience that contributed to your understanding? If so, explain,* and, *How did your collaborative team contribute to your confidence in teaching 21st century skills, if at all?*

Focus Group Protocol

The original study included a semi-structured focus group interview protocol (Appendix I) to allow participants in the study to collaboratively make meaning of their experience and evaluate teachers' sense of efficacy for teaching 21st century skills after participating in the intervention. Like the individual interview protocol, multiple questions on the focus group protocol were informed by the quantitative items on Tschannen-Moran and Woolfolk Hoy's (2001) Teacher Sense of Efficacy Scale (TSES). The focus group protocol also included questions specific to teachers' experience during the task design and implementation phases of the original study.

Process Evaluation Instrumentation

Three instruments were originally identified to evaluate the study's fidelity of program implementation and teachers' initial use of the program. These included a professional learning session log (Appendix K), a task feedback tool (Appendix L), and a task implementation documentation form (Appendix M). In the amended study, only a professional learning session log was implemented. Table 4.5 compares process evaluation instruments used in the original study design and the amended study design.

Table 4.5

Process Evaluation Instruments Proposed and Implemented in Original and Amended Studies

Instrument	Proposed in Original Study?	Implemented in Amended Study?
Professional Learning Session Log	Yes	Yes
Task Feedback Tool	Yes	No
Task Implementation Documentation Form	Yes	No

Professional Learning Session Log

The professional learning session log (Appendix K) provided data to evaluate the degree to which professional learning sessions were implemented with fidelity. It prompted the researcher to indicate whether all activities were implemented as planned, and if not, to describe what changes were made, why the changes were made, and how the changes may impact planning for the next session(s), if at all. The target indicator was that four of five sessions would be implemented as planned.

Task Feedback Tool

In the original study design, the task feedback tool (Appendix L) evaluated the degree to which teachers effectively applied new learning to design tasks using the 6 A's Framework. It prompted the researcher to indicate which components of the framework were reflected in the

task and to provide evidence for each. The tool also allowed for feedback so that teachers could revise tasks before implementation, as appropriate. The target indicator was integrating four of six framework components.

Task Implementation Documentation Form

In the original study design, the task implementation documentation form (Appendix M) evaluated the degree to which teachers implemented new tasks as planned. It prompted teachers to indicate whether they implemented tasks as planned, identify factors that facilitated or impeded implementation, and describe any changes they might make if they implemented the task again. The target indicator was that 85% of interdisciplinary teams would implement their tasks as designed.

Procedure

The original intervention procedure included three phases: professional learning sessions, collaboration sessions, and task implementation. These phases are identified in Table 4.6 and described in detail below. Due to the amended study design, only the first phase, professional learning sessions, was implemented in this study.

Table 4.6

Intervention Activities, Frequency, Constructs, and Change Mechanisms

Intervention Activity	Frequency/ Timeframe	Construct(s) Targeted	Change Mechanism(s)
Phase 1: Professional learning sessions	5 hours (1 hour weekly for 5 weeks)	Teacher knowledge; Teacher efficacy	Direct instruction; collaborative learning; vicarious experience; verbal persuasion
Phase 2: Collaboration sessions	6 hours (1 hour weekly for 3 weeks, plus a 3-hour session)	Teacher knowledge; Teacher efficacy	Vicarious experience; verbal persuasion

Phase 3: Task implementation	3 to 5 hours (4 to 7 45-minute class periods	Teacher efficacy	Mastery experience

Note. Due to the amended study design, only the professional learning sessions, bolded above, were implemented as an intervention activity.

Phase 1: Professional Learning Sessions

The first phase of the intervention included five professional learning sessions that introduced teachers to 6 A's Framework components. These sessions occurred during regularly scheduled professional learning time. As teachers examined the task design components, sessions also incorporated the concepts of authentic pedagogy (Newmann & Wehlage, 1993), integrated content (Brazee & Capelluti, 1995; Drake, 2007), and academic self-regulation (Pintrich & De Groot, 1990; Zimmerman, 1998). To support professional learning, sessions were held over 5 one-hour periods spanning three months (Darling-Hammond et al., 2017), utilized artifacts from teachers' classroom practice (Desimone & Garet, 2015; Garet et al., 2001; Zepeda, 2008), drew connections between in-school and out-of-school learning (Stasz et al., 1992), and involved dialogue and collaboration through a community of practice model (Palinscar et al.,1998; Wenger et al., 2002). An overview of professional learning sessions is given in Figure 4.3, followed by a description of each session.

Figure 4.3

Professional Learning Plan Overview

Session	Focus Area(s): 6 A's Framework and Instructional Core for 21st Century Learning	Learning Objective	Learning Tasks
1	Components of 6 A's Framework	Teachers will identify current strengths, areas for growth, and	• Examine 6 A's Framework components and criteria • Evaluate current strategies and tasks in relation to 6 A's

		questions in relation to the 6 A's Framework	criteria, identifying evidence of specific areas of strength • Share areas of strength with colleagues
2	Authenticity	Teachers will identify real-world problems or questions related to their respective disciplines	• Identify real-world problems or questions that students may explore in each discipline • Share examples across disciplines
4	Active exploration; authentic pedagogy	Teachers will identify components of authentic pedagogies to engage students	• Review videos on strategies such as inquiry-based learning and service learning • Identify major characteristics of active exploration and authentic pedagogy
3	Applied learning; academic self-regulation	Teachers will describe characteristics of semi-structured problems/tasks; Teachers will describe characteristics of tasks that promote student self-regulation	• Compare examples of structured and semi-structured tasks and questions • Read text excerpt on applied learning (Steinberg, 1998) • Discuss common characteristics of semi-structured tasks and questions within teams • Share findings across groups
5	Adult connections	Teachers will identify the academic benefits of partnering students with adult mentors and identify potential sources of mentors within the community	• Read text on adult mentors to support academic tasks (Steinberg, 1998) • Identify benefits of collaborating with community members to serve as adult mentors • Brainstorm current or possible resources to support adult mentoring relationships

Session 1. In the first session, teachers engaged in an appreciative inquiry process (Evans, Thornton, & Usinger, 2012) to identify current areas of excellence in relation to the 6 A's framework. They considered their previous tasks and instructional strategies in order to identify evidence of strengths in relation to framework criteria. In addition to recording their own

written reflections, teachers shared the strengths they identified with colleagues. This session was intended to introduce the framework and criteria, as well as to establish that the intervention would validate and build on teachers' current practice.

Session 2. Teachers explored the framework component of *Authenticity*. They worked in teams to answer the question, "What authentic (real-world) issues, questions, or contexts are relevant for your discipline?" Teachers were encouraged to consider both their previous experience as well as opportunities that they had not yet tried. Teachers posted answers to the central question using the Poll Everywhere platform, and reviewed the responses of their colleagues on the platform. Teams discussed responses across disciplines.

Session 3. Teachers explored the framework component of *Active Exploration*. They worked in teams to discuss the question, "How do we help students actively explore content through meaningful investigations?" To inform their conversation, teachers viewed short film clips on projects enacted at other schools that required two forms of active exploration, inquiry-based learning and service learning. Teams discussed their thinking in relation to these clips, including how they might incorporate these strategies into their content areas, and shared highlights from their respective discussions.

Session 4. Teachers explored the framework component of *Applied Learning*. Teachers worked in disciplinary teams to answer two questions: "What do semi-structured problems grounded in the context of life and work beyond school look like?" and "How do tasks support academic self-regulation?" Teachers compared examples of structured tasks and questions (e.g., *How much would implementing these pollution preventing devices cost us?*) and semi-structured tasks and questions (e.g., *Design a pollution-preventing device that would serve our community's specific needs*.) They also read an excerpt from *Real Learning, Real Work* (Steinberg, 1998) that

discussed the relevance of applied learning in school tasks. Teams identified characteristics of semi-structured tasks that supported problem-solving and self-regulation, and teachers shared their thinking across teams.

Session 5. Teachers explored the framework component of *Adult Connections*. Two questions guided their discussion: "How can we use adult mentors to guide and assess work?" and "What potential mentor connections have we already established within the community?" Teachers read a text excerpt on the value and roles of adult mentors (Steinberg, 1997), which included examples of how they might be used to support student learning. They worked within interdisciplinary teams to identify how mentors from outside the school community could support students in their respective disciplines. Teachers also identified partnerships the school had already established, or could establish in the future, that could offer a source of adult connections to support student learning.

Phase 2: Collaboration Sessions

According to the original study design, following the five one-hour sessions described above, teachers would have applied their learning through a series of three one-hour collaboration sessions and a one three-hour block during a professional learning day in March. During collaboration sessions, teachers would have worked in assigned interdisciplinary teams (Borrego & Newswander, 2008; Stewart & Perry, 2005) to design an original learning task using components from the 6 A's Framework. They would have identified content standards from each discipline as well as one to two 21st century skills they wished to address in the task, satisfying the task design component of academic rigor, which was not specifically addressed in professional learning sessions. Teams would then choose three to five additional components from the framework to address as they designed the task. They would share their respective tasks

with colleagues during the three-hour professional learning block to receive feedback and revise their tasks as appropriate.

Phase 3: Task Implementation

Finally, according to the third phase of the original study design, teams would have implemented their respective tasks with students. Depending on the nature of the task, teachers may have implemented tasks either during a 45-minute academic class period, or during the school's flex block, a 35-minute period intended, though not currently used, to support integrated learning experiences. During regularly scheduled staff meeting time, teachers would have opportunities to meet in interdisciplinary teams to discuss the implementation process and make adjustments as necessary. Teams would also have been able to share their implementation experiences with each other.

Data Collection

Process and outcome evaluation data were collected at pre-determined times throughout the intervention. These times, along with data collection procedures, are outlined below.

Outcome Evaluation

The researcher-created questionnaire was administered twice, once prior to the first professional learning session (Session 1) and one following the final professional learning session (Session 5). Teachers self-selected a participant code so responses could be compared before and after the intervention, while still maintaining respondent confidentiality. The questionnaire was issued electronically to teachers via e-mail using Google Forms. Teachers completed the pre-intervention questionnaire at school during professional learning time. Due to the school's closure, they completed the post-intervention questionnaire from home.

Like the questionnaire, the teacher efficacy survey was administered twice, once prior to the first professional learning session and approximately one month after the final session. The survey was issued electronically to teachers via e-mail using Google Forms. Teachers used the same self-selected participant code for the pre- and post-intervention questionnaire. They completed the pre-intervention questionnaire at school during professional learning time. Due to the school's closure, participants completed the post-intervention questionnaire from home.

Finally, participants engaged in a semi-structured individual interview approximately six weeks after the final professional learning session. All interviews occurred via Zoom videoconferencing technology, and lasted 15 to 40 minutes. The researcher electronically recorded the interview to maintain an audio recording and transcribe participants' comments.

Process Evaluation

Data collection for the process evaluation occurred throughout the intervention. The researcher updated the professional learning session log at the end of each of the five professional learning sessions, indicating whether the session was implemented as planned and what changes, if any, were made to the original plan. The log was stored electronically on the researcher's computer.

Data Analysis

Data analysis included the separate analysis of both quantitative and qualitative data, as well as the converging of these separate strands of data. The sections below detail the processes used for quantitative and qualitative data analysis, and for converging data to draw conclusions from the mixed-methods study.

Quantitative

Quantitative analysis for the pre- and post-intervention questionnaire and the teacher efficacy survey involved descriptive statistics (Onwuegbuzie & Leech, 2006). Quantitative data from the pre- and post-intervention questionnaire and survey items were entered into SPSS. The researcher calculated the mean scores of each of the eight items on the questionnaire measuring teacher knowledge and compared these from pre- to post-intervention data. Additionally, the researcher bifurcated responses into two categories, agree and disagree/unsure, and compared the rates at which teachers selected each category before and after the intervention.

For the 21 items on the teacher efficacy survey, the researcher also used descriptive statistics. She created a composite score variable within the pre- and post-intervention data. The researcher then compared distribution of data before and after the intervention. Further, the researcher calculated the mean scores for each item on the survey and conducted an item analysis to compare the pre- and post-intervention mean scores.

Qualitative

Qualitative data from the interview were analyzed using two coding cycles. The researcher transcribed electronic recordings of each interview, assigning pseudonyms to each participant to protect confidentiality. During the First Cycle coding process (Miles, Huberman, & Saldana, 2014), preliminary a priori codes such as *appreciative inquiry* (AI), *community of practice* (CP), and *teacher efficacy* (TE) were used. Second Cycle coding (Miles et al., 2014) utilized conventional content analysis, in which codes emerged directly from the data (Braun & Clarke, 2006; Hsieh & Shannon, 2005), to identify additional themes within the data. These codes included *teacher collaboration* (TC), *student engagement* (SE), and *new learning* (NL). Final overall themes that emerged in the third round of coding included *interdisciplinary*

dialogue (ID), *collaborative planning* (ColP), and *efficacy for planning instruction* (EPI). Figure 4.4 lists codes for each coding cycle.

Figure 4.4

Coding Cycles, Code Labels, and Code Descriptions for Qualitative Data Analysis

Coding Cycle	Code Label	Code Description
First (A Priori)	TE	Teacher efficacy/confidence
	NK	New knowledge/learning
	EI	Efficacy for instruction
	EE	Efficacy for engagement
	EC	Efficacy for classroom management
	ME	Mastery experience
	VP	Verbal persuasion
	VE	Vicarious experience
	AI	Appreciative Inquiry
	CP	Community of practice
Second (Emergent)	TC	Teacher collaboration
	IG	Interdisciplinary group
	SE	Student engagement
	FL	Future/continued learning
	FP	Future practice
	LE	Liked about experience
	RC	Recommended change to experience
	6A-21	Correlations between 6 A's Framework and 21st century skills
	ET	Examples of Tasks
Third	CL/AP	Continued learning and applications to practice

Final Themes	ID	Interdisciplinary dialogue
	ColP	Collaborative planning
	EPI	Efficacy for planning instruction
	INT	Integrating academic and 21st century learning
	6AR	Reflections on framework components

Converging Data

A final component of the outcome evaluation compared and interpreted both data strands through an organized narrative. Each strand was presented separately, then interpreted to analyze how the strands confirmed or disconfirmed each other. Separately, these components answered questions about the degree to which teachers' knowledge and efficacy for teaching 21st century skills improved as a result of the intervention. Together, they revealed correlations between the constructs of knowledge and efficacy (Shadish, Cook, & Campbell, 2002). Comparing data may explain which factor more extensively influenced teachers' ability to integrate 21st century skills, or alternatively, raise questions to guide further exploration (Creswell & Plano Clark, 2018).

Conclusion

This intervention was informed by an earlier needs assessment within the research context, as well as by literature on an instructional core for 21st century learning, task design, professional learning design, and teacher efficacy. The purpose of the intervention was to improve teachers' pedagogical knowledge and efficacy for teaching 21st century skills in order to maximize students' opportunities to engage with 21st century skills through classroom learning tasks. The chapter presented outcome and process evaluation questions, described the research sample, and presented a convergent parallel mixed-methods design to guide data collection, analysis, and interpretation procedures. It also distinguished between the original

design of the study, and the amended study that was implemented as a result of the COVID-19 crisis in Spring 2020. Chapter 5 details the implementation process, presents quantitative and qualitative findings, and draws conclusions about the intervention's effectiveness in meeting its intended aims.

Chapter 5: Findings and Conclusions

Despite calls for college and career readiness across the K-12 education arena, secondary students are not developing the competencies necessary to thrive in a globalized, post-industrial world (Eng, 2012; Wagner, 2012). As employer demands change and new jobs emerge (Johnson, 2000; Smith & Anderson 2014), business leaders report that recent entrants to the workforce are ill-prepared in areas such as communication, collaboration, critical thinking, creativity, problem-solving, and cultural awareness (Casner-Lotto & Barrington, 2006). While schools recognize the need for 21st century skills, they approach them with an uncoordinated vision and fragmented effort. This is especially true in middle schools, where responsibility for college and career readiness is not well defined (Kay, 2012). Without a holistic and systematic approach to guide the integration of these competencies into everyday learning experiences, teachers maintain their focus on teaching and assessing traditional academic knowledge and cognitive skills (Greenhill, 2010; Hsu, Wang, & Runco, 2013; Noweski, Scheer, Buttner, et al., 2012; Saavedra & Opfer, 2012).

This chapter discusses the findings of an intervention designed to offer a holistic approach to guide the integration of 21st century skills with academic content, and in turn, to support teacher efficacy for teaching 21st century skills. The intervention tested the effectiveness of professional learning on a task design framework to strengthen teachers' efficacy for teaching 21st century skills. According to an earlier needs assessment, teachers in the research context believed in the importance of teaching 21st century skills at the middle school level, but had not systematically integrated these competencies alongside academic content in their respective courses. The intervention aimed to introduce and implement a task design framework that could

support teachers across disciplines in purposefully integrating 21st century skills into student learning tasks.

The 6 A's Framework was selected as a focus for the intervention because its six components embodied the components of an instructional core (City et al., 2009) for 21st century learning: authentic pedagogy, integrated curriculum, and academic self-regulation. Four of these components—Authenticity, Active Exploration, Applied Learning, and Adult Connections—were deeply examined through professional learning sessions during the intervention (Table 5.1). Two additional components—Academic Rigor and Assessment—were not a major focus of the intervention due to their emphasis in previous professional learning experiences at CCA.

Table 5.1

Components of the 6 A's Framework, Correlation to Instructional Core for 21st Century Learning, and Inclusion in Research Study

Component	Correlation to Instructional Core for 21st Century Learning	Focus of Intervention
Academic Rigor	Integrated Curriculum	No
Authenticity	Authentic Pedagogies	Yes
Applied Learning	Authentic Pedagogies, Integrated Curriculum	Yes
Active Exploration	Authentic Pedagogies, Academic Self-Regulation	Yes
Adult Connections	Authentic Pedagogies, Academic Self-Regulation	Yes
Assessment	Integrated Curriculum, Academic Self-Regulation	No

The original design of the intervention involved three phases. In the first phase, teachers would engage in ongoing, embedded professional learning that began with identifying current

evidence of strengths in relation to the 6 A's Framework, and proceeded to examine specific components of the framework. This professional learning leveraged an appreciative inquiry approach as well as a communities of practice model to enable teachers to build on their previous practice while also learning with and from one another. In the second phase, teachers would collaborate in interdisciplinary teams to design at least one original task using the new framework. In the third phase, interdisciplinary teams would implement their respective tasks and share their experiences with other colleagues. As described below, due to the closure of schools and transition to distance learning resulting from the spread of COVID-19, only the first phase of the study was implemented.

This study collected, analyzed, and converged quantitative and qualitative data to examine three research questions:

RQ1. To what extent did professional learning on the 6A's Framework alter teachers' knowledge, if at all, of how to teach 21st century skills?

RQ2. To what extent did professional learning on the 6A's Framework alter teachers' efficacy, if at all, for teaching 21st century skills?

RQ3: To what extent did teachers' collaboration in a community of practice impact their teaching efficacy?

Findings related to these questions are organized thematically in this chapter. The next section provides an overview of intervention implementation. Subsequent sections detail findings related to teacher knowledge, teacher efficacy, and teacher participation in a community of practice. The chapter then discusses these findings in relation to major conceptual and theoretical frameworks. It concludes with recommendations for practice and limitations of the study.

Overview of Implementation

Implementation of the original study began in mid-January 2020. Prior to the first professional learning session, ten teachers completed the pre-intervention questionnaire and teacher efficacy survey electronically. Two professional learning sessions were held during teachers' weekly professional learning time. Few changes were made to the original plans for these sessions. After the two initial sessions, central office administrators announced that the school program would permanently close at the end of the year due to fiscal constraints and facility limitations. Out of respect for the CCA staff, many of whom learned that they would lose their employment, the researcher postponed further professional learning sessions for several weeks.

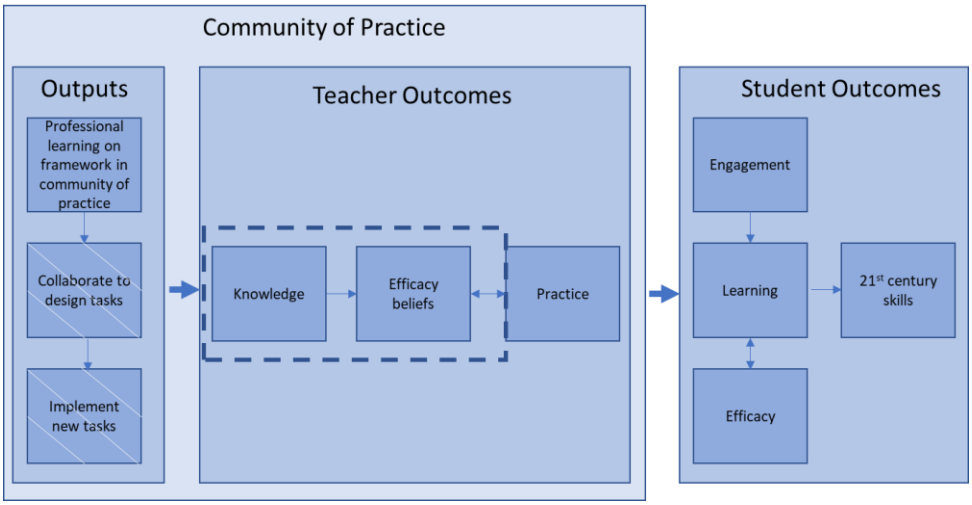
Professional learning resumed about a month later, with three remaining professional learning sessions held between late February and mid-March 2020. No structural changes were made to the original plans for these sessions. Procedurally, the researcher made a minor change in allowing teachers to work within the same interdisciplinary groups for each session, rather than asking teachers to transition between content area teams and interdisciplinary teams. This change was made to allow teachers a greater sense of dialogue continuity within their smaller communities of practice. Two study participants were absent during the course of the intervention, each missing one professional learning session.

The first day of interdisciplinary collaboration to design original tasks using the 6 A's Framework was planned for March 13. However, on March 12, the school district announced that all schools, including CCA, would be closed due to the COVID-19 crisis until further notice; it was later announced that schools would remain closed and transition to distance learning for

the remainder of the academic year. Given this development, the researcher amended the study to include only the first phase of implementation involving professional learning (Figure 5.1).

Figure 5.1

Conceptual Framework for Intervention Implementation



Note. This conceptual framework illustrates the outputs and outcomes associated with the intervention. Outputs that were not implemented are indicated with shading lines.

Participants were invited to re-enroll in the amended study; six of the original ten participants volunteered to continue. The post-intervention questionnaire and teacher efficacy survey were sent via e-mail to these six teachers approximately one month later. Individual interviews, occurring through Zoom, replaced the original focus group and began the following week. An implementation timeline is given in Table 5.2.

Table 5.2

Intervention Implementation Timeline

Timeframe	Activity/Event	Number of Study Participants
Early January	Pre-intervention data collection	10
Early- to mid-January	Session 1 (overview of framework and appreciative inquiry)	10

	Session 2 (Authenticity)	
Late January	Announcement of permanent school closure in June 2020	10
Late February to mid-March	Session 3 (Active Exploration) Session 4 (Applied Learning) Session 5 (Adult Connections)	10
Mid-March	Announcement of transition to distance learning due to COVID-19	10
April	Study design amended	6
Mid-April	Post-intervention data collection	6

Community of Practice

Of the ten teachers who enrolled in the original study, six volunteered to continue in the amended study. The research sample included teachers with a range of professional experience and represented five content areas: math, science, English-language arts, physical education, and developmental guidance. A contextual overview of participants in the amended study is included in Table 5.3 below.

Table 5.3

Participant Contextual Information

Participant (Pseudonym)	Content Area	Years of Teaching Experience
Emily	Math	26
Reese	Physical Education	6
Helen	English-Language Arts	14.5
Aaron	Developmental Guidance	4.5
William	Science and Math	1

The six study participants were a subset of a 14-member school-wide community of practice that participated in professional learning on the 6 A's Framework during designated after-school professional learning time. They were divided among five small interdisciplinary teams within the larger community of practice; each interdisciplinary team included teachers who did not participate in the study. During the five professional learning sessions, interdisciplinary teams, ranging in size from two to four teachers each, met to discuss content from the session. As they responded to specific prompts posed by the researcher, teachers shared professional experiences, questions, predictions, ideas, and concerns within their teams. The researcher briefly joined each team during each session; in some cases, she observed, in other cases, she answered questions or participated in the dialogue. At the end of each session, the teams came back together as a school-wide community of practice and representatives from each team verbally summarized their respective teams' discussions with other teams. The impact of this collaborative process, and of the professional learning series, on teachers' knowledge and efficacy for teaching 21st century skills, is discussed in the next section.

Findings

Teachers participated in five professional learning sessions focused on components of the 6 A's Framework. This section details findings on the impact of these professional learning sessions. It presents quantitative and qualitative data on teacher knowledge, then converges these data to draw conclusions about the intervention's effects on teacher knowledge. It then presents quantitative and qualitative data on teacher efficacy and participation in communities of practice, similarly converging data to draw conclusions about the study's impact.

Teacher Knowledge

The first research question asked to what extent professional learning on the 6 A's Framework altered teachers' knowledge of how to teach 21st century skills. This section begins with quantitative data from the teacher questionnaire that illustrate the impact of the intervention on teacher knowledge. It then presents qualitative data from individual teacher interviews. Finally, quantitative and qualitative data are converged to draw conclusions about changes in teacher knowledge as a result of professional learning on the 6 A's Framework.

Quantitative Findings on Teacher Knowledge

The teacher questionnaire asked teachers to self-assess their knowledge of components of the 6 A's Framework and their ability to design tasks using this framework. The rating scale ranged from 1 (strongly disagree) to 5 (strongly agree), with a rating of 3 indicating uncertainty. A comparison of pre- and post-intervention scores, including mean scores and the number of teachers who agreed or strongly agreed with each item before and after the intervention, is given in Table 5.4.

The first item on the questionnaire asked teachers to rate the degree to which they knew "specific strategies that can help me integrate 21st century skills into student learning tasks." On this question, the mean score increased from 3.2 on the pre-intervention questionnaire, to 4.2 on the post-intervention questionnaire. This increase reflected the movement of all five respondents from *disagree* or *unsure*, to *agree* or *strongly agree*. The second question asked teachers whether they knew how to design tasks that integrated all components of the 6 A's Framework. Here, the mean score increased from 2.0, indicating disagreement among all participants, to 3.4, indicating a combination of uncertainty and agreement. The increases suggested that teachers believed their

general knowledge of how to integrate 21st century skills into student learning tasks had increased as a result of the intervention.

Teacher knowledge also grew in relation to individual components of the 6 A's Framework. For each framework component that was addressed in professional learning sessions, mean scores increased. Teachers' self-reported knowledge of how to design tasks that exemplified Authenticity showed the greatest increase, with the mean rising from 3.2 to 4.2. Two respondents agreed that they knew how to integrate authentic learning into student tasks on the pre-intervention questionnaire, and most disagreed or were uncertain; after the intervention, five out of five agreed. Adult Connections also saw an increase, from a mean score of 3.0, to a mean of 3.8. Though only one teacher reported that he knew how to integrate Adult Connections on the pre-intervention questionnaire, three agreed on the post-intervention questionnaire.

Gains related to other components of the framework were more modest. Three teachers agreed that they knew how to use Applied Learning strategies both before and after the intervention. Respondents similarly agreed that they knew how to incorporate Active Exploration to a relatively consistent degree, with three teachers agreeing before and four after. Academic Rigor, which was not a significant focus of the intervention, saw one teacher move from *disagree* to *unsure*, while others did not change. Assessment, which was not addressed during the intervention, saw no change in mean scores or the number of respondents agreeing.

Table 5.4

Teacher Knowledge of 21st Century Skill Strategies and 6 A's Framework

Item	Pre-Intervention Mean	Post-Intervention Mean	Pre-Intervention Agree	Post-Intervention Agree
I know specific strategies that can help me integrate 21st century skills into student learning tasks	3.2	4.2	0	5

I know how to design learning tasks that combine ALL components of the 6 A's Framework	2.0	3.4	0	2
I know how to design learning tasks that exemplify Authenticity	3.2	4.2	2	5
I know how to design learning tasks that exemplify Applied Learning	3.4	3.6	3	3
I know how to design learning tasks that exemplify Active Exploration	3.6	3.8	3	4
I know how to design learning tasks that exemplify Adult Connections	3.0	3.8	1	3
I know how to design learning tasks that exemplify Academic Rigor	3.6	3.8	4	4
I know how to design learning tasks that exemplify Assessment	3.8	3.8	4	4

Based on these self-reported data, teachers appeared to grow in their knowledge of several individual components of the 6 A's Framework, particularly those that were emphasized most during the professional learning sessions. While only two teachers reported that they knew how to design tasks that integrated all six components, increases in teacher knowledge in relation to individual framework components may directly support elements of an instructional core (City et al., 2009) for 21st century learning. Of these elements, authentic pedagogy correlates with three framework components that saw increases during the intervention (Authenticity, Active Exploration, Adult Connections), while student academic self-regulation correlates with two framework components that saw increases (Active Exploration, Adult Connections). In turn, this new knowledge could contribute to a more systematic integration of 21st century skills into student learning tasks. Qualitative data detailed in the next section help to elaborate on these findings.

Qualitative Findings on Teacher Knowledge

Study participants took part in individual interviews following the intervention. During interviews, each teacher reported that professional learning sessions that examined components of the 6 A's Framework deepened their knowledge of the components and of the components' relation to 21st century skills. Several teachers noted that although they were familiar with 21st century skills prior to the intervention, they did not have a deep understanding of pedagogical approaches to teach these skills. For example, Reese, a physical education teacher, said, "Before we did this, I didn't…know a lot. I didn't really have a good understanding of…how to implement [21st century skills] at all." Although Reese's lessons depended on students' demonstrating 21st century skills such as collaboration and communication, her courses' learning outcomes focused on national physical education standards. She had not previously believed she could support student achievement on these standards, which was reported annually through state physical education testing, while also teaching 21st century skills. "After the 6A's and after the learning," she said, "I definitely know more."

Sentiments like Reese's were echoed across the interviews. Aaron said that professional learning on the 6 A's Framework had "given me new skills" for his developmental guidance program. "I've always heard of 21st century skills like creativity, but I didn't actually know what did that look like [instructionally]. How do you give students those actual skills?" he reflected. Although Aaron's program—comprised of grade-level curricula addressing themes such as social relationships, decision-making, self-esteem, study skills, and planning for the future—often involved students' practicing 21st century skills such as creative thinking, these skills had been ancillary and unintended in his planning. Moreover, Aaron realized that though he excelled at building individual relationships with students, this rapport was not sufficient to realize 21st

century learning; rather, his instruction needed to intentionally support real-world learning outcomes. “It’s not [only about] connections you’re making with your students,” he said, “it’s about making connections that are authentic in the real world.” The intervention offered teachers like Aaron a new way to think about planning and instruction in order to systematically develop students’ 21st century learning. Themes regarding teachers’ new thinking and skills emerged from the qualitative data. These two themes—the integration of academic content and 21st century learning outcomes and task design ideas—are described below.

Academic Content and 21st Century Skills Integration. For some teachers, learning about components of the 6 A’s Framework yielded a deeper understanding of how 21st century skills could be purposefully integrated with academic content. Helen, an English-Language Arts teacher, saw the framework as helping teachers to overcome the pressures of external accountability measures and standardized tests. “So many people are teaching to one right answer and they’re not helping kids develop the critical and creative thinking to be problem solvers. Using the 6 A’s, the kids [also] engage with 21st century skills,” she said. Helen planned to use the framework in all of her planning moving forward and proposed that it become “something that we use to ground everything” across the school. “I think it is the right move to make [in a standards-based program],” she continued. For Helen, who had previously tried to implement components of the 6 A’s Framework—such as Active Exploration and Authenticity—in isolation, the greatest value of the framework was its capacity to integrate multiple strands of 21st century learning in one cohesive task. “Otherwise you have good little pieces all over, but none of them got glued to one starting point,” she said.

For Emily, a math teacher, the framework offered the potential to improve academic outcomes while also building real-world competencies. “This gives me a menu of other ideas

that I feel like I need help with because I'm so [focused on standards]," she said. Emily had been frustrated by her students' multi-year trend of low scores on both standardized and classroom assessment measures. Though a veteran teacher, she recognized that she did not know how to improve students' performance in some grade-level standards. "[The framework] at least shows me this is the stuff you're not doing, so why don't we try some of these things and see if the [academic] results get better?" she reflected. Emily further offered that her new learning on the 6 A's Framework had led her to begin rethinking how she designed student learning tasks. "The experience has really helped me take a look at what I'm asking kids to do in class," she said, "and…go back to the beginning of the planning stages of my lessons and take a critical look at what do I have in there that meets this [framework] criteria?" The framework provided Emily a new lens through which to view her planning and instruction, and the possibility of strengthening her students' academic and 21st century learning.

Ideas for Task Design. Each teacher reflected on how he or she might use components of the framework to integrate academic content with 21st century skills in existing or new tasks. Some ideas were not fully developed, though several teachers offered rich descriptions of these student learning tasks. For Anne, the 6 A's Framework presented an opportunity to reconceptualize one of her English-Language Arts units. She proposed a revised version of the unit that would enable her to teach non-fiction writing standards alongside 21st century skills such as collaboration, communication, and media literacy. She explained:

> Our final unit of the year involves memoirs. We're reading [memoirs] and I'm going to have [students] write their own memoirs. During the unit there [could be] a lot of emphasis on authenticity, collaboration, and using technology to share our

> stories and present information. That could've been an interesting opportunity to take what we've been working on and try to put it together.

In this revised unit, Anne sought to leverage her new professional learning to make learning more meaningful and relevant for students. Her proposal offered a developmentally-appropriate task that would empower students to communicate important personal experiences in their own voices. The task aimed to place students in the authentic roles of memoir writers, peer editors, and publishers to explore and deepen their understanding of the non-fiction narrative structure and writing process. Such a task, which would extend learning outside the classroom through the use of digital media platforms, would be both rigorous and engaging for learners.

A second task example came from William, a science and math teacher. He proposed a math task that would teach geometry standards along with 21st century skills such as problem solving and creativity:

> We were going to take my geometry standards and bring in a landscaper to show the kids, this is actually authentic. You're going to be using this in real life [to create a design]. Have the person come back every week or two, see how they're doing. A lot of our geometry is composite shapes, putting together a triangle and rectangle to form this odd shape. A lot of times [students are] looking at this like, why do I need to know this? This is stupid….But if you're going to build a patio, for instance, you don't want to do a boring rectangle, you want something cool. How do we do this? Let's bring in a professional, let's talk about their standards. Look, this guy uses these formulas…he's using the stuff you're actually learning in sixth grade to do what he does in life.

William's task aimed to build math competencies by creating opportunities for students to engage in their real-world application. Grounded in the 6 A's Framework components of Authenticity, Adult Connections, and Active Exploration, it stemmed from an authentic context, reached outside the classroom, and involved mentorship and feedback from professionals who used academic concepts in their own lives each day. As William recognized, such a task could answer questions of "Why do I need to know this?" while also supporting the teacher's purposeful integration of content standards and 21st century skills. This could potentially result in a task that was both appropriate and motivating for students.

Notably, each of Anne and William's colleagues also described tasks that emphasized similar components—Authenticity, Adult Connections, and Active Exploration—of the framework. For example, Emily described a new mathematical probability task set in the authentic context of the region's major casinos, while Helen hoped to bring in local lawyers who could share insights on crafting effective arguments and provide feedback on students' argumentative writing. Reese suggested a fieldwork-based task that would partner students with regional college athletic coaches and trainers to help teens design realistic work-out plans to meet individual fitness goals. Prior to the intervention, Authenticity had not been consistently evident in teachers' tasks; where it was evident, examples were limited to one-time projects. Likewise, there had been few examples of Active Exploration or Adult Connections across the school during the preceding school year. Yet, perhaps due to teachers' perception of the immediate relevance for students, these components of the framework seemed to resonate most strongly with participants. This finding was echoed in the quantitative data, as discussed further below.

Converging Data

Both quantitative and qualitative data suggested that teachers increased their knowledge of how to integrate 21st century skills into student learning tasks as a result of the intervention. The five teachers who completed the post-intervention questionnaire all reported that they knew specific strategies to teach 21st century skills; in comparison, zero reported having this knowledge prior to the intervention. Teachers elaborated on this new learning during the interviews, explaining that the intervention's professional learning sessions provided knowledge to help them "go back to the beginning stages of [planning] my lessons," provided "a menu of other ideas," and clarified "what did [teaching 21st century skills] look like."

Quantitative data indicated that teachers' knowledge increased the most in relation to the 6 A's Framework components of Authenticity and Adult Connections. Qualitative data corroborated this finding, with teachers highlighting the same components in their descriptions of tasks that could capitalize on the framework. Teachers described tasks that incorporated authentic contexts and connections with adults who professionally engage in the work of their respective disciplines. Authenticity and Adult Connections, which draw on all aspects of an instructional core for 21st century learning—authentic pedagogy (Preus, 2012; Newmann & Wehlage, 1993), transdisciplinary learning (Brazee & Capelluti, 1995; Drake, 2007), and student academic self-regulation (Pintrich & De Groot, 1990; Zimmerman, 1998)—dominated teachers' responses about new learning to integrate 21st century skills. Not only was their knowledge in these areas evident, but their interest in pursuing these further suggested that teachers may also have felt most confident in using these components to design original tasks in the future. This sense of teaching efficacy is discussed further below.

Teacher Efficacy

The second research question asked to what extent professional learning on the 6 A's Framework altered teachers' efficacy for teaching 21st century skills. This section begins with quantitative data from the teacher efficacy survey that help to answer this question, followed by qualitative data from individual teacher interviews. The section then reviews quantitative and qualitative data from the third research question, which focuses on the impact of teachers' collaboration in communities of practice, to discuss whether this collaboration contributed to teachers' sense of professional efficacy.

Quantitative Findings on Teacher Efficacy

A teacher efficacy survey, adapted from the Science Teachers Efficacy Beliefs Instrument (Enochs & Riggs, 1990), provided quantitative data to evaluate teachers' efficacy for teaching 21st century skills before and after the intervention. To analyze the results of the teacher efficacy survey, the researcher created a composite score for all 21 survey items. Possible composite scores ranged from 21, indicating *strongly disagree*, to 105, indicating *strongly agree*. On the pre-intervention survey, participants' composite scores ranged from 66 to 72, with a mean of 69.4 (Table 5.5). These data were not distributed normally, but rather, were skewed right, indicating that teachers had a relatively high sense of efficacy for teaching 21st century skills.

The post-intervention teacher efficacy survey produced a smaller range, with composite scores ranging from 66 to 69. On this second administration of the survey, the mean score was 67.6. The continuity of the distribution curve suggests a greater degree of normalcy in these data. While some teachers' individual composite scores increased, others decreased on the post-intervention teacher efficacy survey. Therefore, in comparison to the pre-intervention data, post-

intervention data indicate a regression to the mean.

Table 5.5

Comparison of Composite Ranges and Mean Scores on Pre- and Post-Intervention Efficacy Surveys

	Pre-Intervention Efficacy Survey	Post-Intervention Efficacy Survey
Composite Range	66 to 72	66 to 69
Mean Score	69.4	67.6

Additionally, an item analysis compared the mean scores for each item on the pre- and post-intervention surveys (Table 5.6). The greatest degree of change was evident in the item, *I do not know how to excite students about 21st century skills*. On this reverse-coded item, the mean decreased from 4.0, with all teachers agreeing, to 2.4, with most teachers disagreeing or indicating uncertainty. Likewise, on the item, *I am not very effective in monitoring 21st century skill activities*, the mean decreased from 3.8, or mainly agree, to 2.4, or mainly disagree. For this reverse-coded item, four teachers agreed on the pre-intervention survey and one was unsure; following the intervention, four teachers disagreed and one was unsure. In contrast, the only item for which there was no change among respondents was, *I believe I can continually find better ways to teach 21st century skills*. On both the pre- and post-intervention surveys, all respondents agreed with the statement, suggesting that teachers initially possessed, and continued to possess, some sense of efficacy for improving their instruction of 21st century skills.

Table 5.6

Quantitative Survey Selected Item Analysis

	Pre-Intervention Efficacy Survey Mean Score	Post-Intervention Efficacy Survey Mean Score

I do not know how to excite students about 21st century skills	4.0	2.4
I am not very effective in monitoring 21st century skill activities	3.8	2.4
I believe I can continually find better ways to teach 21st century skills	4.0	4.0

These data indicate that, as a result of new learning, teachers who were more certain about their relative efficacy for teaching 21st century skills prior to the intervention may have become less certain over time. As some individuals' scores increased toward the mean, others decreased, coalescing around the mid-point of uncertainty. At the same time, the item analysis suggested specific areas of increase in teacher efficacy, particularly in relation to exciting students about 21st century skills and monitoring 21st century skill activities. New learning may have contributed to teachers' thinking more deeply about their practices, questioning whether their beliefs and assumptions about teaching 21st century skills were accurate, and building new knowledge and strategies to support further professional learning over time.

Qualitative Findings on Teacher Efficacy

In this section, qualitative data on changes in teacher efficacy are presented. Findings on the impact of professional learning on the 6 A's Framework on teacher efficacy are discussed in relation to two themes: 1) strategies for student engagement and classroom management, an a priori theme, and 2) continued learning about teaching 21st century skills and the application of learning to practice, an emergent theme. Later, additional data on the impact of teachers' participation in a community of practice are shared, highlighting teachers' perspectives on interdisciplinary collaboration and the role of the community of practice in supporting 21st century task design.

Strategies for Engagement and Classroom Management. Professional learning about the 6 A's Framework enabled teachers to consider how new strategies might impact their sense of efficacy for engaging students and managing the classroom environment. Teachers reflected on the anticipated impact that tasks designed using the framework could have on their students. For Reese, the framework offered the potential to integrate real-world competencies that could bring new relevance to student learning in her physical education classes:

> I think it would help drive some of that learning because it makes it come to life. With middle school students, [who] are so ego-centric and so about themselves, they really need to understand and connect what they're learning about to how it's going to be applied in real life. When you can link those together, then their motivation intrinsically goes through the roof and they can dive into some cool stuff.

Reese expected that teaching 21st century skills alongside academic content could be an important factor for motivating her students, some of whom regularly opted out of physical education. Understanding how their new learning could benefit them outside of school, she believed, would engage students more deeply in her classes.

Helen similarly believed this integration could result in higher levels of engagement and effort in her academic courses, and she shared an example to support her belief. She detailed an experience in which she informally tested several components of the 6 A's Framework in her classroom after participating in the first four professional learning sessions. Using the components of Active Exploration and Applied Learning to frame her design, Helen developed a task to teach English-Language Arts standards along with two 21st century skills, social skills and productivity. In the task, students utilized a technology platform to access, produce, and interact with each other around new information. As she implemented the task:

> I was so impressed with [students'] level of engagement and their attempt to take risks and put themselves out there and how they pushed themselves forward—more than I had seen in a [previous] task. Most of [their work] became public and they were all doing it and gave it a much better attempt.

Helen had observed that this task had engaged students in the learning process by making learning relevant and meaningful. It had also created an authentic peer audience for students' work, increasing students' sense of accountability for a high-quality product that demonstrated targeted reading and writing standards. Helen shared that, based on her experience, she would "absolutely" want to create similar tasks to support students' engagement, motivation, and ownership for learning.

Teachers further believed that as the 6 A's Framework helped them integrate 21st century skills and inspire deeper student engagement, this engagement could also support their ability to manage the learning environment. Anne expected that tasks using components of the framework would empower students to be "really, genuinely engaged in what's in front of them," and when this occurred, students would be "definitely more focused on that than being off task." Emily also saw the value of designing tasks that were both academically rigorous and relevant in the real world. "You're gonna have a lot less kids that are bored or taking advantage of dead spots in your lessons," Emily said. "I think it has a huge impact." For these teachers, planning an instructional task that integrated academic content and 21st century skills held the promise of strengthening their personal teaching efficacy for classroom management as a result of increased student engagement.

Continued Learning and Application to Practice. Teachers felt confident that professional learning on the 6 A's Framework could support their continued learning about

teaching 21st century skills, as well as facilitate their ability to apply their learning to practice in the future. William, who reported that he was "totally more confident" teaching 21st century skills as a result of the intervention, felt a stronger sense of efficacy for his ongoing learning as well as his future instructional practice:

> Now I have concrete examples and I have words to put to [my practice]…. So I feel more confident with my professionalism and I feel if someone said to me, 'This is how we teach [with 21st century skills],' I could say, 'Perfect, I'm in, I know this…'
>
> I feel I may not be expert, but…I feel confident continuing to learn and grow in this.

As a first-year teacher who had not participated in CCA's previous discussions and professional work on 21st century skills, William recognized that he had more to learn about teaching 21st century skills. However, his exposure to the 6 A's Framework had provided a foundation on which he could build as his knowledge and practice evolved with further experience.

Others believed that, as a result of their professional learning on the framework, they had a roadmap for future planning. Aaron shared that the sessions had clarified how he might bring 21st century skills into his instruction, making him more confident in his ability to integrate them with different groups of students. He noted that the 6 A's Framework would be "helpful in guiding my work moving forward." Likewise, Helen, who had already begun to experiment with components of the framework, saw it as a useful instrument that could steer her instructional design in years to come. She said, "I would like to [continue to] use the 6 A's Framework to integrate 21st century skills [because] I'm planning to center the student work around 21st century skills." For these teachers, the framework was a tool that could support their confidence in applying their learning to practice.

While five of six teachers echoed this increased sense of efficacy for teaching 21st century skills using the framework, Emily was more measured in her evaluation. When asked if the 6 A's Framework could help her feel more confident about designing tasks that integrated 21st century skills, she answered, "It would depend on what I'm teaching." Emily added, "I might have a hard time finding a practical use for some topics because a lot of the practical uses are just way above their levels." For Emily, the potential for integrating 21st century skills into instruction was limited by the degree to which she believed she could make math content relevant for students; her confidence in her ability to achieve one depended on her confidence in her ability to realize the other. Emily also hoped that in the future she could "write a lesson that incorporates this stuff. Let me learn by doing." Emily suggested that continued collaboration and planning with others could help her identify relevant contexts and applications for math content, potentially increasing her efficacy for integrating 21st century skills.

Like Emily, other teachers wished that they could have completed the intervention as originally designed in order to deepen their sense of efficacy for teaching 21st century skills. For example, Anne offered that she would have liked to have designed and implemented a task that integrated 21st century skills in her own classroom. "If we had followed through on the original plan, it would've taken me from the beginning all the way through a concrete task," she said. "I would've been able to see if it worked and if it was something I wanted to keep working with." Teachers like Anne sought further opportunities to apply and test their new learning in order to test their mastery of new learning, evaluate the impact on students, and potentially deepen their efficacy for teaching 21st century skills.

Teachers also suggested that, if they had been able to complete the intervention as originally planned, seeing examples of tasks designed by other teachers would have been helpful

before they designed their own. “It’d be cool to look into other schools that are doing it…to drive the rest of the learning,” said Reese. “Listening to someone who’s already implemented them and seeing those…little tips and pointers on how to bring [21st century skills] in and really be successful [would be helpful],” she added. Aaron agreed, saying he would like “to see what [tasks] would look like in other schools that have been successful doing it.” He surmised that this “could be a helpful way to go one step further.” These comments indicate the potential value of further vicarious experiences in supporting teacher efficacy for teaching 21st century skills, particularly as teachers began to apply their new learning to practice.

Communities of Practice. The third research question asked to what extent teachers’ collaboration within a community of practice contributed to their efficacy for teaching 21st century skills. On the teacher questionnaire, one item asked teachers to rate the degree to which professional collaboration and dialogue had contributed to their learning about teaching 21st century skills in the last month. Prior to the intervention, the mean score for this item was 3.0, with all five teachers selecting *to a moderate degree*. Following the intervention, the mean was 3.8, with four teachers indicating that collaboration and dialogue had contributed to their learning *to a significant degree*, and one remaining unchanged. Therefore, four of five teachers found that verbal persuasion experiences in the form of peer dialogue and collaboration associated with the intervention had positively impacted their learning.

During individual interviews, all six teachers reported that participation in the community of practice was an “important,” “helpful,” and “useful” component of the professional learning sessions. In some cases, professional dialogue in their respective interdisciplinary teams helped to clarify teachers’ thinking. Reese—who, as CCA’s only physical education teacher, had never had a team with which to collaborate—found this dialogue critical for deepening her

understanding of the framework components. “To listen to someone else’s ideas, and then think about it, and then talk with them, that’s what really helps me,” she said, adding, “the real learning and expansion happens when I get to talk with somebody and bounce ideas off them.” Helen, too, found that collaborative dialogue brought precision to her thinking. “I get so…clarified when discussing things with [colleagues]. I have a tendency to overcomplicate….That time to clarify and simplify [with others] is essential.” For these teachers, working within a community of practice refined their individual thinking about new learning, offering verbal persuasion experiences that supported their sense of efficacy.

Participation in a community of practice was also a source of inspiration and new ideas, allowing teachers to hear the perspectives and experiences of their peers. Helen said, “I am motivated and inspired by, and I draw so much from [the colleagues I worked with].” Emily thought that this collaborative dialogue was especially important because, “It’s really easy to get into a rut and just do what you do and forget there’s other parts of the school….It really is valuable to hear what other people are doing because educators are notorious for borrowing ideas from others.” These interactions provided a source of vicarious experience that enabled teachers to learn from others, and in turn, to deepen their own sense of efficacy for implementing new practices.

Teachers described further experiences from the community of practice that positively impacted their sense of efficacy for teaching 21st century skills. For some, the first professional learning session, which introduced the 6 A’s Framework using an appreciative inquiry approach, cultivated an initial sense of confidence that strengthened teachers’ efficacy for learning about 21st century skill integration. Like several of his colleagues, William took comfort in knowing that he was “doing some of these things anyway.” Similarly, Anne found it useful to reflect on

"how [each component] related to what we were doing already and if we wanted to build on that or add something different." For Emily, this supported a feeling of instant engagement in new learning. "The exciting part of it is, we've done something kind of like this before, now can we enhance it, can we streamline it, can we make it so we're all communicating and working together?" she said. While engaging with a new task design framework could have been overwhelming to some educators, an appreciative inquiry approach that involved a self-evaluation of teachers' individual strengths in relation to the framework fostered an initial sense of efficacy for continued growth.

The researcher's framing of the professional learning experience may likewise have contributed to teachers' sense of efficacy for new learning. Helen cited a comment from the researcher early in the intervention that motivated her continued learning throughout the professional learning sessions:

> What I really appreciated going into this was, it worked perfectly for me, was when [the principal/researcher] said, 'Take risks. What have you always wanted to do before that you have never done?' It was permission to step away from, not the rigor and the standards, but step away from the plan of, I know in my head this is what I have to do….I felt inspired.

Helen actively participated within her community of practice, offering personal experiences and ideas to others on her interdisciplinary team. She believed she had the freedom and flexibility to approach her instruction in a new way, and she used the community of practice as a context to share and test her new ideas with her colleagues. This example suggests that verbal persuasion from leaders may be an important factor driving efficacy outcomes during the professional learning process.

Finally, beyond the community of practice at CCA, teachers found value in the extended community of practice that was created by learning from teachers in other schools. Although participants did not engage in dialogue with these other practitioners, several teachers cited the impact of short videos illustrating how teachers in other settings were using components of the 6 A's Framework to integrate 21st century skills with academic content. For example, William reported:

> I really appreciated when [the researcher]…gave examples of how other schools, other teachers, might be using this. I appreciated that because a lot of times I'll read about [something] and I'm like, Am I doing this?....And then I'll see other people doing them and I'm like, 'Oh, I'm doing this'…. It gave me a concrete thing to be like, 'OK, this is what I'm doing.'

Drawing from the experiences of other professionals engaged in similar work aided teachers in confirming their understanding and envisioning new possibilities for their own practice. This extended community of practice, which could potentially grow into a networked improvement community (Bryk et al., 2015), provided a source of additional vicarious experiences to strengthen teachers' sense of efficacy for teaching 21st century skills.

Interdisciplinary Dialogue. Several teachers pointed to the value of not only engaging with colleagues around new practices, but also talking specifically with colleagues in diverse disciplines. For example, Anne, an English-Language Arts teacher, was particularly appreciative of the opportunity to engage with colleagues who held diverse perspectives. "I don't know that I would have given [a different approach] much thought if…we hadn't had time for that conversation…. Hearing what [Emily] was saying and trying to convince her of where I was coming from was really helpful," she said. Previously, Anne's professional collaboration had

been limited to meetings with her content area team. However, during the community of practice, she talked with colleagues in disciplines such as math and science. A relatively inexperienced teacher, Anne was able to deepen her learning by engaging with colleagues outside of the content team she had worked with for the last two years.

William, another new teacher, found that "the interdisciplinary [groups] helped." Given his math and science expertise, he said, "I know how to think math and science. I don't necessarily know how to think Spanish and ELA. Having the Spanish and ELA perspective, I was like, oh, all right. That was a cool perspective." More experienced educators found the experience meaningful, as well. Aaron appreciated hearing how teachers in other content areas could apply components of the framework to their practice. "I have to look at what other teachers [outside my discipline] are doing. What does this look like in their classes?" he said. Interdisciplinary dialogue not only deepened Aaron's thinking, but also presented opportunities for him to consider interdisciplinary and transdisciplinary learning. "We can carry it over into different classes, so you're not just working in isolation, everyone is doing it together," he suggested. For these teachers, an emphasis on developing strong content area teams in previous years had precluded opportunities for dialogue across content areas. The interdisciplinary nature of the communities of practice, new for many educators at CCA, was an important factor supporting their thinking and learning about 21st century skill integration.

Collaborative planning. Finally, several teachers discussed how much they would have liked to have planned original tasks in collaboration with others in their community of practice. William said he had been "super excited" to talk with colleagues about task design, and "wish[ed] we had more time to plan collaboratively" in order to benefit from each other's

thinking. Emily was particularly disappointed not to be able to collaborate on task design as part of the intervention. “It would’ve been something that I would’ve enjoyed,” she said, adding:

> I was looking forward to, let’s have someone who’s better or more well versed in [some] of these other things, I’d like to sit down with them and plan lessons together….This seemed like a good way to get some things incorporated that I wouldn’t normally be doing on my own.

Most teachers at CCA, including William and Emily, are singletons who do not share grade-level courses with other teachers. As a result, although many have worked in content area teams to share instructional strategies and strengthen curricular alignment from grade to grade, they do not often have opportunities to collaboratively plan tasks and lessons for their own courses. Participation in a community of practice during the professional learning sessions generated an interest in continued collaboration during future task design processes.

Other teachers wished for continued collaboration in order to receive feedback as they began to apply their new learning to practice. Aaron pointed out that his colleagues were “good at giving each other feedback,” so he would have trusted their insights and input as he worked to design a new task. For Reese, “It would be really helpful, after I created and implemented [a task], to have time set aside to go back, reflect on it, talk through it with somebody…” Hearing feedback from a colleague, along with having time to evaluate the task herself, would allow her to make revisions to strengthen the task. Emily also shared that she would like the chance to receive improvement feedback from colleagues. “Let’s go through what [their] process would be,” she said, “and help me generate some ideas for myself.” For these teachers, there was evidence of interest in further opportunities for verbal persuasion within a community of practice to support their sense of efficacy as they applied their learning to practice.

Converging Data

When pre- and post-intervention data were compared, quantitative data from the teacher efficacy survey indicated a regression to the mean over time. In other words, teachers who felt more strongly about their confidence level, whether relatively high or low, prior to the intervention tended to coalesce around the mean after the intervention. This is perhaps not surprising, given that the data were arrested due to the COVID-19 closure. Had the intervention continued as planned, the task design and implementation phases would have occurred; these were anticipated to be the major drivers of efficacy, according to the treatment theory. With the opportunity to apply their learning and observe the results of their efforts, more changes in teacher efficacy may have been expected. Instead, the quantitative findings may suggest that teachers began to reflect on their efficacy for teaching 21st century skills, but without time to test new ideas in practice, their thinking about their sense of efficacy was still in progress.

Evidence of this thinking-in-progress can be found in teachers' interview responses. While teachers did not have new mastery experiences to draw on, they did recognize areas of their current practice that aligned with the new task design framework. Many suggested that their previous experiences could provide a foundation to help determine "if we wanted to build on that or add something different." As a result of not having implemented the 6 A's Framework themselves, most teachers could only predict the outcomes of using the framework with students. Most expected that the framework would help them "center the student work around 21st century skills," "really, genuinely engag[e]" students, and minimize the number of "kids that are bored or taking advantage of dead spots in your lessons," suggesting an increase in strategies for engagement and classroom management. Using past experiences to make projections about

future practice, they appeared confident that the 6 A's Framework would be useful, but most did not have the opportunity to test these assumptions in their own classrooms.

Several teachers also spoke of their confidence in using the 6 A's Framework to plan 21st century learning tasks, as opposed to their confidence in teaching 21st century skills. This was perhaps best evidenced in teachers' rich descriptions of tasks that they hoped to design using components of the 6 A's Framework. Such a distinction may suggest that some teachers believed they had a starting point for future learning and application, but given that they did not implement their tasks in the classroom, they did not necessarily feel more confident teaching new competencies yet. Moreover, all teachers identified strategies that could support their confidence moving forward, including further engaging with or extending the community of practice model to "look into other schools that are doing it," to "learn by doing," and to have "more time to plan collaboratively" and " go back, reflect on it, talk through it with somebody." They each considered the next level of work to deepen their individual learning and efficacy, noting their confidence in "continuing to learn and grow." Accordingly, teachers' efficacy for teaching 21st century skills may have increased less than their efficacy for continuing their own professional learning for teaching 21st century skills.

Quantitative data also indicated that teachers believed that professional collaboration had positively impacted their learning. Specifically, on the post-intervention questionnaire, four out of five teachers reported that collaboration during the intervention had impacted their learning *to a significant degree*. Qualitative data supported this finding. During the interviews, all six teachers commented that participation in communities of practice had been a useful aspect of the professional learning sessions. They noted that this form of collaboration had helped them to "clarify and simplify" their thinking, share "cool perspective[s]," and "hear what other people

are doing." Although teachers did not work in interdisciplinary teams to design and implement original tasks, their participation as members of a community of practice during the intervention played an important role in enriching their learning and supporting their sense of efficacy for later applying new learning to practice.

Conclusions and Discussion

The findings above corroborate, extend, and deepen this study's conceptual and theoretical frameworks to support conclusions about how schools may systematically integrate 21st century skills in order to prepare students for life beyond school. This section discusses conclusions in light of the instructional core for 21st century learning, the P21 professional learning framework, and teacher efficacy theory. Recommendations for practice and implications for future research are offered based on these conclusions. The section concludes with an acknowledgement of study limitations.

Teacher Knowledge

This study sought to increase both teacher knowledge and teacher efficacy. The section that follows reviews findings related to teacher knowledge, examining increases in teacher knowledge in relation to the process and content of professional learning. Specifically, the impact of the Partnership for 21st Century Learning's (2015) criteria for effective professional learning on 21st century skills are connected to teacher knowledge outcomes in this study. Further, teachers' knowledge of components of the 6 A's Framework, and the relationship between these components and an instructional core for 21st century learning, are discussed.

Criteria for Professional Learning

This study confirmed that the Partnership for 21st Century Learning's (2015) criteria for effective professional learning on 21st century skills can positively impact teacher knowledge of

strategies for teaching 21st century skills. These criteria include: (1) scalable and sustainable learning; (2) specific tools and strategies; (3) examples of content and skill integration; and (4) knowledge sharing. Professional learning at CCA occurred over five one-hour sessions, a sustained duration that allowed teachers the opportunity to incrementally deepen their new knowledge over time (Desimone & Garet, 2015; Garet et al., 2001; Opfer & Pedder, 2011). It was also grounded in active learning and professional practice, a scalable approach that allowed teachers to share examples from their own teaching experience as they made sense of new learning and refined each other's thinking within their community of practice (Blank & de las Alas, 2009; Darling-Hammond et al., 2017; Desimone & Garet, 2015; Garet et al., 2001; Zepeda, 2008). Teachers' increases in knowledge as a result of these sessions affirmed the finding of Shear et al. (2011) that sustained, active, embedded learning is necessary to support teachers' integration of 21st century skills in the classroom.

Professional learning sessions also provided teachers with specific tools and strategies to implement new instructional approaches (Tschannen-Moran & Chen, 2014) and integrate academic content with 21st century skills (Stasz et al., 1992). Sessions included examples of practice, such as video clips of students engaging in inquiry-based learning and textual descriptions of how adult mentors had supported learning in and out of the classroom (Steinberg, 1998). These examples helped teachers envision how they might apply new tools and strategies to teach academic content alongside 21st century skills, resulting in examples of risk tasks they could develop for their own students. Moreover, the community of practice offered teachers extensive knowledge-sharing opportunities. The model empowered teachers to collectively speculate on what these tools and strategies might look like in their individual content areas, grapple with questions and anticipated challenges, and clarify and deepen their thinking about

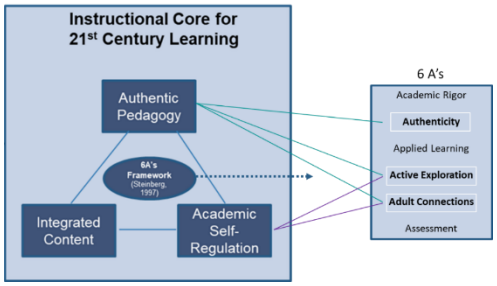
new practices. Each of these aspects of the professional learning sessions, aligned with criteria from the Partnership for 21st Century Learning (2015), contributed to teachers' knowledge about using the 6 A's Framework to integrate 21st century skills into student learning tasks.

Instructional Core for 21st Century Learning

The most significant growth in teacher knowledge, as evidenced by data from the teacher questionnaire and teachers' descriptions of potential tasks, was related to three framework components: Authenticity, Adult Connections, and Active Exploration (Figure 5.2). As a result of their learning, teachers understood the purpose of setting tasks in real-world contexts, the value of extending learning outside the classroom, and the significance of connecting middle school students with adults to engage around shared concepts and skills. This understanding suggests teachers found authentic pedagogy (Newmann and Wehlage, 1993) the most compelling or accessible element of an instructional core (City et al., 2009) for 21st century learning. Such a finding supports research on authentic pedagogies' potential to improve 21st century skills (Akin et al., 2017; Beckett & Miller, 2006; Boaler, 1999; Finkelstein et al., 2010; Johnson & Johnson, 2009; Morales et al., 2013; Richards et al., 2013) through real-world challenges, project-based learning (Buck Institute of Education, 2018), or simulated contexts (Kong et al., 2014).

Figure 5.2

Instructional Core for 21st Century Learning and 6 A's Framework Component Correlations



Note. This figure illustrates the 6 A's Framework's relationship to an instructional core for 21st century learning, and the framework components that emerged as major themes in the study.

Teachers' purposeful attention to authentic pedagogies during the task design process may ultimately result in tasks that prepare middle school students not only for the next level of learning, but also for life beyond school. Authentic learning experiences such as Anne's memoir-writing task, William's patio-building task, or Reese's fitness plan task, involve students in applying their academic learning in ways that also develop 21st century skills such as creativity, adaptability, collaboration, and productivity. They empower students to tackle problems or issues they might encounter outside the classroom, and to engage in actual or simulated real-world processes to address these problems or issues. Grounded in grade-level standards, tasks framed by authentic pedagogies fundamentally support students' academic achievement, but also move beyond this to contribute to students' ongoing preparation for life outside of school.

Teachers' knowledge in relation to Active Exploration and Adult Connections may also underscore the relevance of a second element of an instructional core for 21st century learning, student academic self-regulation. Adult Connections promotes students' relationships with, and accountability to, mentors outside the classroom, enabling students to interact with adults who may model and scaffold self-regulation strategies (Boekaerts & Corno, 2005; Zimmerman, 1989) or provide feedback on students' thinking or performance (Cooper et al., 2005; Sierens et al., 2009). Likewise, Active Exploration places responsibility for extending learning on students, requiring a level of autonomy that may both demand and deepen self-regulation strategies (Sierens et al., 2009). This study suggests that Adult Connections and Active Exploration may be avenues through which to promote instruction in academic self-regulation—and, in turn, in 21st century skills (Sanz de Acedo Lizarraga et al., 2003)—at the middle school level.

As a result of teachers' increased knowledge in these components of the 6 A's Framework, teachers may be more likely to design tasks that support students' development of

academic self-regulation competencies, and in turn, support the systematic integration of 21st century skills into everyday learning opportunities. Stronger academic self-regulation may help students attend to and engage in rigorous, unstructured, or unfamiliar tasks (Cooper et al., 2005). Moreover, tasks that support academic self-regulation may contribute to students' development of 21st century skills such as initiative, self-direction, productivity, and responsibility (Butler, 2002; Sanz de Acedo Lizarraga, Ugarte, Cardelle-Elawar, Iriarte, & Sanz de Acedo Baquedano, 2003), which may further enrich students' capacity to engage in new learning experiences that might otherwise result in frustration, demotivation, or resistance (Bruning et al., 2011; Honkimaki et al., 2004; Nicaise et al., 2000). As teachers recognized, tasks designed using the 6 A's Framework—particularly components such as Active Exploration and Adult Connections—could positively impact students' engagement, motivation, and inspiration for taking on new challenges in the future.

Finally, this study did not identify an increase in teacher knowledge related to the three framework components that would support the third element of an instructional core for 21st century learning, integrated curricular content. Two of these components, Academic Rigor and Assessment, were not a significant focus of the intervention due to their previous emphasis in professional learning at CCA. Therefore, teachers' self-ratings in these areas did not increase during the course of the intervention; notably, their task examples did not demonstrate significant attention to these components, either, perhaps because it was not an explicit focus of learning during their most recent professional learning experience. The third component, Applied Learning, was a focus of the intervention, but teachers did not demonstrate evidence of increased knowledge in this area according to the questionnaire and interview data. Further attention to these components may be necessary to continue to strengthen teachers' ability to promote

integrated curricular content in student learning tasks and automatize integrated approaches into their thinking. This integrated approach can help to ensure that learning contexts and processes are truly authentic, transcending disciplinary boundaries in ways reflective of the world outside of school (Gavelek et al., 1999; Ross & Hogaboam-Gray, 1998). Such an approach will help teachers to purposefully integrate academic content with 21st century skills (Drake & Reid, 2018), and in turn, help middle school students learn, practice, and perform in ways that prepare them for college, career, and life.

Middle School as a Site for College, Career, and Life Readiness

Although no empirical studies have tested the impact of the 6 A's Framework on improving student learning outcomes, the data collected here suggest that teachers increased their knowledge of framework components that could ultimately inform student task designs and potentially impact student learning outcomes at the middle school level. This study therefore builds on previous research examining school-to-work reforms in high school contexts (Eisenman et al., 2003) and indicates that products of these reforms, such as the 6 A's Framework, are also relevant and useful in middle schools. Moreover, it broadens the focus of such reforms, shifting from an emphasis on high school as the primary context for post-secondary preparation (Berube, 1996; Resnick et al., 1995; Tanner, 1997), to the inclusion of the middle grades as an equally important site for instruction supporting college, career, and life readiness. The framework's unique capacity to merge multiple strands of 21st century learning, including authentic pedagogies and student self-regulation, make this an important tool for teachers' planning and instruction around 21st century skills across secondary programs.

Using the framework as a tool to teach 21st century skills with and through disciplinary content (Newmann et al., 2001; Lombardi, 2007; Mattern et al., 2014; Partnership for 21st

Century Skills, 2015; Paige, 2009), secondary schools may better mediate the ongoing tension between the learning function and the socioeconomic function of schooling (Lingard & McGregor, 2014; Widdowson et al., 2015). Middle school teachers, in particular, can apply their knowledge of framework components to remediate the weaknesses of either-or curriculum propositions (Cuban, 1990), which have traditionally framed middle-level education as a site for either academic preparation or personal growth (Beane, 1990; Eichhorn, 1966; Schaefer et al., 2016). As CCA teachers' task examples illustrate, the 6 A's Framework—and more broadly, the application of an instructional core for 21st century learning—may not only prepare middle grades students for the next level of learning, but may also generate opportunities for students to transfer their learning outside the classroom (Johnson, 2000; Resnick, 1987). The 6 A's Framework can support middle school teachers in designing the relevant, challenging, and exploratory learning experiences envisioned by the National Middle School Association (1982) nearly four decades ago, empowering adolescents to develop a range of competencies—academic and non-academic alike (Aarons et al., 2014). Ultimately, this will help to fulfill Americans' demand for public education that prepares students for the complexities of 21st century life (Goo, 2015; Phi Delta Kappan, 2016).

Teacher Efficacy

In addition to increasing teacher knowledge, this study also positively impacted teacher efficacy. This section reviews findings about teacher efficacy in relation to Bandura's (1977) self-efficacy theory, as well as teacher efficacy theory. It draws conclusions about the impact on teacher efficacy in relation to multiple aspects of the process of professional learning, including the use of appreciative inquiry and communities of practice, and considers evidence of teacher efficacy drivers that were evident in the study.

Teacher efficacy theory, grounded in Bandura's (1977) self-efficacy theory, defines teacher efficacy as a teacher's personal belief in his or her "capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context" (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998, p. 233). Bandura's (1977) efficacy theory suggests that factors including mastery experiences, vicarious experiences, and verbal persuasion may drive increases in self-efficacy. Previous research has indicated that these drivers are also sources of personal teaching efficacy (Akhavan & Tracz, 2016; Hagen, Gutkin, Wilson, & Oats, 1998; Hora & Ferrare, 2012; Morris & Usher, 2011; Tschannen-Moran & Woolfolk Hoy, 2007).

Teachers in this study reported that they believed the 6 A's Framework could help them increase student engagement and ownership for learning, as well as minimize behavioral disruptions in the classroom. These dimensions of personal teaching efficacy may be important indicators of teachers' future practice (Tschannen-Moran & Woolfolk-Hoy, 2001) in relation to teaching 21st century skills. As previous research has demonstrated, teachers with stronger personal teaching efficacy for engagement may be more likely to design tasks that promote the integration of 21st century skills and more likely to regard students as capable of achieving success on these tasks (Ashton & Webb, 1986; Bencze & di Giuseppe, 2006; Yeung, Craven, & Kaur, 2014). Similarly, teachers with a higher sense of personal teaching efficacy for classroom management may be more likely to structure learning environments in which students have opportunities to build their capacity as responsible leaders, creative thinkers, and autonomous learners (Bonwell & Eison, 1991; Woolfolk & Hoy, 1990), as they are less likely to fear student voice and loss of control (Ashton & Webb, 1986). Therefore, this study suggests that increasing teachers' knowledge of strategies to support 21st century skill integration can support teachers'

personal teaching efficacy, and in turn, positively influence their domain-specific efficacy for teaching 21st century skills.

Additionally, the increase in personal teaching efficacy evidenced in this study may also help teachers to mediate the tension between 21st century learning and high-stakes accountability measures. As teachers develop deeper confidence in their ability to apply new learning about 21st century skills to practice, they may better understand how they might use these skills to scaffold, reinforce, or bring meaning to the academic content and skill proficiencies assessed on standardized tests. This confidence may drive a belief that teachers can purposefully pursue both outcomes, without sacrificing one to the other (Schoen & Fusarelli, 2008). As teachers broaden, rather than narrow, their practice (Loeb et al., 2008), they will become more adept at balancing higher-order, real-world skills with the discrete and often low-level skills embedded in high-takes accountability measures (Schoen & Fusarelli, 2008; Szczesiul et al., 2015). Ultimately, teachers' higher sense of efficacy may result in tasks that require students to flexibly and simultaneously use multiple sets of competencies, just as they will in college, career, and life experiences outside of middle school.

Impact of Teacher Professional Experience

Previous studies have established the positive impact of mastery experiences on teachers' personal teaching efficacy (Morris & Usher, 2011; Tschannen-Moran & Woolfolk Hoy, 2007). Due to this study's amended procedures, which precluded teachers' designing and implementing new tasks, there was limited evidence of the impact of mastery experiences on teachers' confidence in their ability to integrate 21st century skills into their classroom. While teachers anticipated positive outcomes of the 6 A's framework on student engagement and behavior, and they believed they could design new tasks that integrated 21st century skills, few had personal

examples from practice to draw on to support their growing sense of efficacy. This illustrates Tschannen-Moran & Hoy's (2001) and Guskey's (2002) arguments that personal teaching efficacy may not grow to its fullest potential without time for "powerful mastery experiences with an eye toward helping teachers garner evidence of improved learning" (Tschannen-Moran & Hoy, 2001, p. 803). Professional learning must include opportunities for teachers to apply their new knowledge and observe the impact of new practices on their own students in order to maximize personal teaching efficacy. This correlation between mastery experiences and teacher efficacy cannot be overstated.

However, the study also suggested that teachers' *previous* professional experiences may support teacher efficacy for new learning in a specific instructional domain. The professional learning process in this study began with an appreciative inquiry approach (Cooperrider & Whitney, 2000) in which teachers identified evidence of alignment between their past practices and the outcomes articulated in the 6 A's Framework. Teachers cited this approach as an aspect of professional learning that positively influenced their enthusiasm and confidence for new learning; they were eager to learn about the framework because they understood how it could build on their previous work. This aligns with Veen's (1993) argument that teachers are more likely and willing to engage in instructional change when reforms complement existing beliefs and practices. Moreover, it contributes to the literature on appreciative inquiry. While previous research has found that appreciative inquiry can increase teachers' voice (Bunshaft, 2018), motivation (Ganjali & Rezaee, 2016), collaboration (Dickerson & Stevens, 2011), and shared understanding (Kozik et al., 2009), this study finds that it may also contribute to teachers' sense of efficacy for new learning. This strength-based approach to organizational and individual

change may strengthen teachers' belief in their ability to enact education reforms, however new or unfamiliar they may be.

Impact of Communities of Practice

Additionally, the study confirmed the importance of vicarious experience and verbal persuasion (Bandura, 1977) for supporting teachers' efficacy for teaching 21st century skills. At CCA, both drivers emerged through teachers' professional collaboration within interdisciplinary and whole-school communities of practice (Borrego and Newswander, 2008; Warren and Payne, 1997; Wenger et al., 2002). While Tschannen-Moran and Woolfolk Hoy (2007) found that vicarious experiences, in particular, may be most impactful for inexperienced teachers, both new and veteran teachers in this study referred to the positive impact that hearing colleagues' experiences, perspectives, and ideas had on their thinking about teaching 21st century skills. Therefore, this study affirms the meta-analysis findings of Cordingley et al. (2003) on the importance of teacher collaboration for deepening teachers' knowledge, confidence, and commitment to continued learning. It also corroborates previous findings on the impact of communities of practice in shaping teachers' beliefs about instructional reform initiatives (Akerson et al., 2009) and impacting teachers' personal efficacy beliefs (Hawkman et al., 2016; Richmond & Manokore, 2011), illustrating the role of vicarious experience and verbal persuasion in realizing these outcomes.

Teachers in this study learned not only within a whole-school community of practice, but also within smaller interdisciplinary communities of practice. Interdisciplinary communities of practice have received minimal scholarly attention (Kodkanon et al., 2018; Warren & Payne, 1997), with previous studies of interdisciplinary teams generally focusing on higher education (Dailey & Hauschild-Mork, 2017; Paskevicius & Bortolin, 2016; Pharo et al., 2014). The present

study supplements this body of literature, suggesting that interdisciplinary communities of practice can support teacher efficacy by offering exposure to more diverse perspectives and experiences than teachers might otherwise encounter. As such, interdisciplinary communities of practice may be a valuable context for supporting teacher efficacy in K-12 schools, particularly when fostering purposeful opportunities for vicarious experience and verbal persuasion. At CCA, this context may have promoted a deeper sense of systems thinking as teachers began to make connections across disciplinary lines, potentially creating opportunities for bringing such thinking to students through the design of integrated curricular tasks.

As a result of this study, teachers began to think more deeply about their instructional planning and practice, and to reflect on their confidence in their ability to teach 21st century skills in a coherent and systematic manner. Their efficacy for teaching these skills was high prior to the intervention and remained high after. When considered alongside other quantitative and qualitative data from the study, this may suggest that while teachers always believed they *could* teach 21st century skills, they now have a stronger understanding of *how* to do so. Despite having only five hours of professional learning time within a community of practice, and having no time to engage in mastery experiences in their respective classrooms, teachers demonstrated a sense of confidence in applying new strategies and approaches in the future. Moreover, as a result of the intervention, they have a clearer perspective on what they will need in order to continue their learning in this area.

With this sense of efficacy for teaching 21st century skills, middle school teachers at CCA may be more likely to purposefully and systematically integrate 21st century skills into student learning tasks. They have developed new knowledge to help them teach academic content along with 21st century skills so that neither is sacrificed to the other, but rather, each

reinforces the other. They have considered areas of individual strength in relation to an unfamiliar framework, observed new practices modeled in videos and texts, and shared candid thoughts and experiences related to these practices with colleagues. These teachers have also recognized the power of collaborative dialogue and meaning-making across disciplinary lines as a force for clarified thinking, new perspectives, and professional inspiration. As a result of their experiences, teachers are well situated to apply their learning and adopt a holistic, cohesive, systematic approach that equips students with the competencies they will need long after middle school. Over time, their sustained efforts will better prepare their students for life in a changing, global society.

Recommendations for Practice

The findings of this study inform several recommendations for practice. As secondary school leaders consider how to integrate 21st century skills across their academic programs, they should ensure that any school reform efforts are collaborative and systemic; build on teachers' current practice and empower teachers to take risks; offer examples and experiences from practitioners who have previously engaged in the work; and include opportunities for professional practice, reflection, sharing, and feedback. Each of these recommendations is detailed below.

Schools that strive to create opportunities for students to develop, practice, and apply 21st century skills must approach this work in a systemic and collaborative fashion. As this study illustrated, teachers' thinking is enriched when they work collaboratively, particularly within interdisciplinary teams, to share perspectives, practices, and experiences on strategies that support 21st century skill integration. Accordingly, 21st century skill integration should not be enacted solely at the individual or departmental levels. Prioritizing a school-wide collaborative

process will leverage individual strengths and deepen professional learning both on an individual basis as well as across a community of practice (Brownell et al., 1997; Bruce & Flynn, 2012; Jensen et al., 2016; Opfer & Pedder, 2011; Shachar & Shmuelevitz, 1997). Through this approach, teacher collaboration will build capacity for systemic reform within schools.

While this intervention focused chiefly on one system, instruction, other systems such as curriculum, assessment, and teacher evaluation must also be independently addressed and collectively aligned to support the school-wide integration of 21st century skills. For example, although transdisciplinary curriculum did not factor strongly into teachers' thinking about 21st century skill integration during this intervention, any systemic reform must ensure that curricula should explicitly address where and how specific 21st century skills are taught, and how they relate to academic content within units of study (City et al., 2009; Rotherham & Willingham, 2009). Likewise, new assessments must be developed to measure both academic and 21st century competencies, while teacher evaluation standards should support accountability for new curriculum, instruction, and assessment practices. Reform within individual systems, and coherence across systems, will create stronger outcomes for districts, schools, teachers, and students (Fullan & Quinn, 2016).

In addition, building professional capacity for teaching and assessing 21st century skills should begin with connections to teachers' previous practices and empower teachers to build on these. School leaders or professional learning facilitators should encourage teachers to reflect on areas where they are already informally integrating 21st century skills, for example, or where the existing curriculum supports real-world connections, prior to engaging in reforms on a deeper level. Adopting an appreciative inquiry approach (Cooperrider & Whitney, 2000) to communicate to teachers that this is not new work, but the next level of work, may cultivate a

more immediate sense of buy-in and efficacy for continued professional learning and growth. Moreover, leaders should empower teachers to take risks and stretch their thinking and practice as they build upon previous experiences. In this study, participants such as Helen recognized the importance of learning in an environment that supported risk-taking in relation to new thinking and practice. As teachers experience this psychological safety in their own learning, they may be more likely to encourage and support students to take risks in their learning, as well.

School leaders should also strive to build networked improvement communities (Bryk et al., 2015) with other professional teams, schools, and districts that have previously engaged, or are currently engaging, in similar work. These large-scale communities of practice, guided by a common understanding of problems, goals, theories, and strategies, can accelerate and organize reform efforts through a disciplined but collaborative improvement science process (Bryk et al., 2015). Further, they offer opportunities for teachers to observe examples of excellence to support their own sense of efficacy. Diverse models of successful practice may help a school more deeply understand the forms that effective 21st century learning may take within their own community.

Lastly, as this study illustrates, professional learning that aims to impact teacher efficacy and practice should facilitate teachers' direct engagement with new content or skills. Although participants in this study did not apply their learning to practice as part of the intervention, they expressed a desire to extend new learning by planning collaboratively, implementing tasks, and receiving feedback. When teachers engage in ongoing application, collaboration, reflection, and feedback as part of the learning process, they may feel more equipped to consistently use new learning (Guskey, 2002; Tschannen-Moran & Chen, 2014). Moreover, such practices may provide teachers opportunities to practice the same 21st century skills that they would teach to

students—among these, collaboration, creativity, problem-solving, and flexibility. Experiencing and reflecting on their use of 21st century skills from the learner perspective may yield greater clarity and confidence when teachers later teach the same skills. Designing professional learning to include these situated learning approaches may support teachers' ongoing development of efficacy for teaching 21st century skills, and ultimately maximize student learning in these skills.

Implications for Future Research

The methods and findings of this study yield several implications for future research. Although this exploratory study was purposefully designed to have a limited sample size given that it tested a new intervention, future studies could include larger teacher samples in order to increase statistical power, promote generalizability, and reduce the threat of response bias. Widening the scope of research to include multiple school settings could also prove beneficial. While this study focused on a single middle school context, comparing outcomes across several middle schools, or across both middle and high schools, could surface differences in 21st century skill integration in diverse secondary contexts.

Additionally, this study considered teaching and learning in a traditional, face-to-face teaching and learning context. However, extensive school closures resulting from the COVID-19 crisis and the shift to online learning platforms suggest the need to consider the efficacy of the 6 A's Framework as a tool for instructional planning in a distance learning or blended learning environment. Specifically, future research questions might ask: Does the 6 A's Framework support teacher efficacy for teaching 21st century skills in an online context? Does the 6 A's Framework support student learning outcomes in relation to 21st century skills in an online context? Such research may find that some components of the framework are more or less relevant when teaching and learning do not occur in traditional school environments.

Finally, future research studies should implement this study has originally designed. With only the first phase of the current study implemented due to the COVID-19 closure, teachers were unable to apply their learning to design new tasks and test them with students. These phases were intended to strengthen teacher efficacy for teaching 21st century skills by providing opportunities for teacher practice, mastery, and continued collaboration. While evidence from this study suggests that teachers' efficacy was positively impacted by professional learning within a community of practice, further research should determine whether the design and implementation phases impact teachers' sense of efficacy for teaching 21st century skills to an even greater degree.

Limitations

There are several limitations associated with this study. There were two major disruptions during the course of the intervention. First, the faculty of CCA received unexpected news only two weeks into the intervention. In late January, teachers learned that CCA would be closing at the end of the 2019-2020 school year, with plans to move and restructure the program in a new region for the 2020-2021 school year. As part of this closure and restructuring, about half of CCA's teachers would be terminated. This announcement negatively impacted staff morale and caused the researcher to suspend the intervention for several weeks. The ultimate impact of this disruption effect (Shadish et al., 20020) on the study findings is unknown.

Additionally, approximately six weeks after the news of CCA's closure at the end of the year, the school facility was closed for the remainder of the year and the original study design was amended due to the COVID-19 crisis. As such, only the first output of the intervention's conceptual framework was implemented. This most certainly impacted the findings of the study, limiting the potential to measure the full range of changes in teacher efficacy. Future studies

should test the intervention as originally planned, with opportunities for teachers to design original tasks in interdisciplinary teams, to implement these tasks with students, and to reflect on the learning outcomes.

Finally, response bias must be considered when examining both quantitative and qualitative data. The researcher was also the school's principal and only administrator, and as such, was the teachers' evaluator and supervisor. Although the researcher took care to protect teacher anonymity on the quantitative measurement tools, and to emphasize that participation and the nature of qualitative responses would in no way impact decisions related to teachers' employment, teachers may knowingly or unknowingly have provided answers that they believed the researcher wanted to hear. To overcome this bias in the data analysis, the researcher compared individuals' qualitative responses and triangulated these responses with quantitative data for a convergent analysis (Lochmiller & Lester, 2017).

Conclusion

This study tested the effectiveness of professional learning on a task design framework, the 6 A's Framework, to support teachers' efficacy for teaching 21st century skills. The purpose of the research was to increase efficacy for teaching 21st century skills in order to create systematic opportunities for students to develop, practice, and apply these competencies during their middle school years. The intervention design, amended as a result of the COVID-19 closure, involved professional learning on each component of the task design framework. Had the intervention been fully implemented, teachers would also have designed an original interdisciplinary task using the framework and tested it with students in their respective classes.

The findings from the amended study indicate that teacher knowledge of strategies to teach 21st century skills increased as a result of the professional learning sessions, despite

significant amendment to the original study design. Teacher efficacy also increased as a result of previous mastery experiences, vicarious experiences, verbal persuasion (Bandura, 1977), and collaboration; however, the full impact on teacher efficacy is unknown, given the abrupt conclusion of the intervention. Quantitative and qualitative data suggest that the professional learning sessions caused teachers to reflect more deeply on their practice and to consider how the 6 A's Framework could support their ability to teach 21st century skills, engage students, and manage their classrooms. The study's findings point to the value of engaging in whole-school, collaborative professional learning to deepen teachers' understanding of how to purposefully and strategically integrate 21st century skills into students' daily learning experiences. Ultimately, such work is essential for preparing all students for life outside of school.

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Appendix A

Teacher Needs Assessment Survey[1]

I. Middle School

1a. What do you believe is the purpose of middle-level education?

1b. How does this purpose differ from the purpose of elementary and high schools, if at all?

2. What should students learn while they are in middle school? Why?

3. What role, if any, should middle schools play in preparing students to be "college and career ready"? Explain.

II. Personal Teaching Efficacy

Efficacy for Engagement:

1. Describe a classroom with strong student engagement. What are students doing and what is the teacher doing?

2.Most teachers would say there are students that they never engage. Are there students you have not been able to engage this year, and if so, why do you think you have not been able to engage them?

3a. How do you attempt to motivate students who show low interest in school work?

3b. Why do you use these strategies and how successful are they?

Efficacy for Instructional Practice:

1. What types of instructional practices or strategies have you used most often this year? Why have you used these practices or strategies more than others?

2a. When a student is having difficulty with a learning task in your class, what is the most common cause of this difficulty?

2b. What, if anything, can you do to help when a student has difficulty with a task for this reason?

3a. How much can you do to help all students think critically?

3b. Give an example of a time when you tried to help students think critically. How successful were you and how do you know?

Efficacy for Classroom Management:

1. Describe the classroom of a teacher with effective classroom management. What are students doing and what is the teacher doing in this well-managed classroom?

2. What are your classroom behavioral expectations for students? To what degree do your current students understand these, and how do you know?

3. How much can you do to prevent or redirect disruptive behaviors in your classroom? Explain.

[1] Survey formatting appeared different on the digital survey platform

III. Personal/General Teaching Efficacy

1. Many things are likely to affect one's effectiveness as a middle school teacher, and these things are likely to be different for different teachers. For yourself personally, think about what helps you to be an effective teacher and what makes it difficult to be effective as a teacher. List everything that you can think of that helps you to be effective in the classroom. Then list everything that you can think of that makes it difficult for you to be effective.

My effectiveness as a middle school teacher…	
…Is facilitated by:	…Is made difficult by:

2. Are there additional factors that may facilitate or hinder teachers' effectiveness, even if they do not apply to you personally now? If so, list them below.

Teachers' effectiveness…	
…Is facilitated by:	…Is made difficult by:

IV. Domain-Specific Efficacy

1. Review the list of skills below. For each skill, use the drop-down menu to select the degree to which you: (a) think the skill is essential, (b) teach it, and (c) feel or would feel confident teaching it.

Skill	This is *essential* for my current students to learn in order for them to be successful in the future	I currently teach this skill in my content area	I feel confident teaching this skill within my content area, or I *would* feel confident teaching this if required
Adapt to change			
Communicate clearly			
Comprehend the "5 W's" in a text			
Demonstrate self-direction			
Follow directions			

Guide and lead others			
Interact effectively with others			
Make judgements and decisions			
Manage goals and time			
Manage projects			
Memorize concepts			
Organize print materials			
Perform basic math operations			
Produce high-quality products/results			
Produce type-written work			
Reason effectively			
Solve novel problems			
Study effectively			
Summarize others' ideas			
Take notes			
Think and act flexibly			
Think creatively			
Use correct grammar			
Use systems thinking			
Work creatively with others			
Work in diverse teams			
Work independently			

2. For skills you do not currently feel confident to teach in your content area, what would make you feel more confident?

Appendix B

Needs Assessment Focus Group Protocol

1. We are going to talk about what students need in order to be successful in the future. How should we define "success" in this case?

2. Based on your definition(s) of success, what do students need to learn in school now in order to be successful in the future? Why?

3. What obstacles get in the way of teaching the competencies you identified as important? What would help you teach these more/better?

4. If the obstacles you identified were removed, what would/could teaching and learning look like in our school?

5. How do you define "21st century skills"? How are these different from the competencies you identified earlier, if at all?

6. To what degree do you believe we, as a school, can prepare students to be successful in the future? To what degree do you believe we are preparing our current students for the future?

Appendix C

Task Analysis Tool

Adapted from the Partnership for 21st Century Learning framework definitions for Learning & Innovation Skills and Life & Career Skills

Focus Question: Does the task create opportunities to develop, practice, or apply the skill?

Rating Scale:

1: No opportunity to develop/practice/apply skill. Skill does not support task completion.

2: Limited or weak opportunity to develop/practice/apply skill. Skill may help task completion but is not necessary; or, superficial use of skill is necessary for task completion.

3: Opportunity to develop/practice/apply skill is implied. Skill is necessary for task completion but not overtly addressed in the task.

4: Opportunity develop/practice/apply skill is explicit. Skill is essential for task completion, highly integrated, and overtly addressed in the task.

Skills, Subskills, & Indicators	Rating: 1-4
CREATIVITY & INNOVATION	
Think Creatively • Use a wide range of idea creation techniques (such as brainstorming) • Create new and worthwhile ideas (both incremental and radical concepts) • Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts	
Work Creatively with Others • Develop, implement and communicate new ideas to others effectively • Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work • Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas	
CRITICAL THINKING & PROBLEM SOLVING	
Reason Effectively • Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation	
Use Systems Thinking • Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems	
Make Judgments and Decisions • Effectively analyze and evaluate evidence, arguments, claims and beliefs • Analyze and evaluate major alternative points of view • Synthesize and make connections between information and arguments • Interpret information and draw conclusions based on the best analysis • Reflect critically on learning experiences and processes	
Solve Problems • Solve different kinds of non-familiar problems in both conventional and innovative ways • Identify and ask significant questions that clarify various points of view and lead to better solutions	

COMMUNICATION & COLLABORATION	
Communicate Clearly • Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts • Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions • Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade) • Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact • Communicate effectively in diverse environments (including multi-lingual)	
Collaborate with Others • Demonstrate ability to work effectively and respectfully with diverse teams • Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal • Assume shared responsibility for collaborative work, and value the individual contributions made by each team member	
FLEXIBILITY & ADAPTABILITY	
Adapt to Change • Adapt to varied roles, jobs responsibilities, schedules and contexts • Work effectively in a climate of ambiguity and changing priorities	
Be Flexible • Incorporate feedback effectively • Deal positively with praise, setbacks and criticism • Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments	
INITIATIVE & SELF-DIRECTION	
Manage Goals and Time • Set goals with tangible and intangible success criteria • Balance tactical (short-term) and strategic (long-term) goals • Utilize time and manage workload efficiently	
Work Independently • Monitor, define, prioritize and complete tasks without direct oversight	
Be Self-directed Learners • Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise • Demonstrate initiative to advance skill levels towards a professional level • Demonstrate commitment to learning as a lifelong process • Reflect critically on past experiences in order to inform future progress	
SOCIAL & CROSS-CULTURAL SKILLS	
Interact Effectively with Others • Know when it is appropriate to listen and when to speak • Conduct themselves in a respectable, professional manner	
Work Effectively in Diverse Teams • Respect cultural differences and work effectively with people from a range of social and cultural backgrounds • Respond open-mindedly to different ideas and values • Leverage social and cultural differences to create new ideas and increase both innovation and quality of work	
PRODUCTIVITY & ACCOUNTABILITY	

Manage Projects • Set and meet goals, even in the face of obstacles and competing pressures • Prioritize, plan and manage work to achieve the intended result	
Produce Results • Demonstrate additional attributes associated with producing high quality products including the abilities to: - Work positively and ethically - Manage time and projects effectively - Multi-task - Participate actively, as well as be reliable and punctual - Present oneself professionally and with proper etiquette - Collaborate and cooperate effectively with teams - Respect and appreciate team diversity - Be accountable for results	
LEADERSHIP & RESPONSIBILITY	
Guide and Lead Others • Use interpersonal and problem-solving skills to influence and guide others toward a goal • Leverage strengths of others to accomplish a common goal • Inspire others to reach their very best via example and selflessness • Demonstrate integrity and ethical behavior in using influence and power	
Be Responsible to Others • Act responsibly with the interests of the larger community in mind	

Appendix D

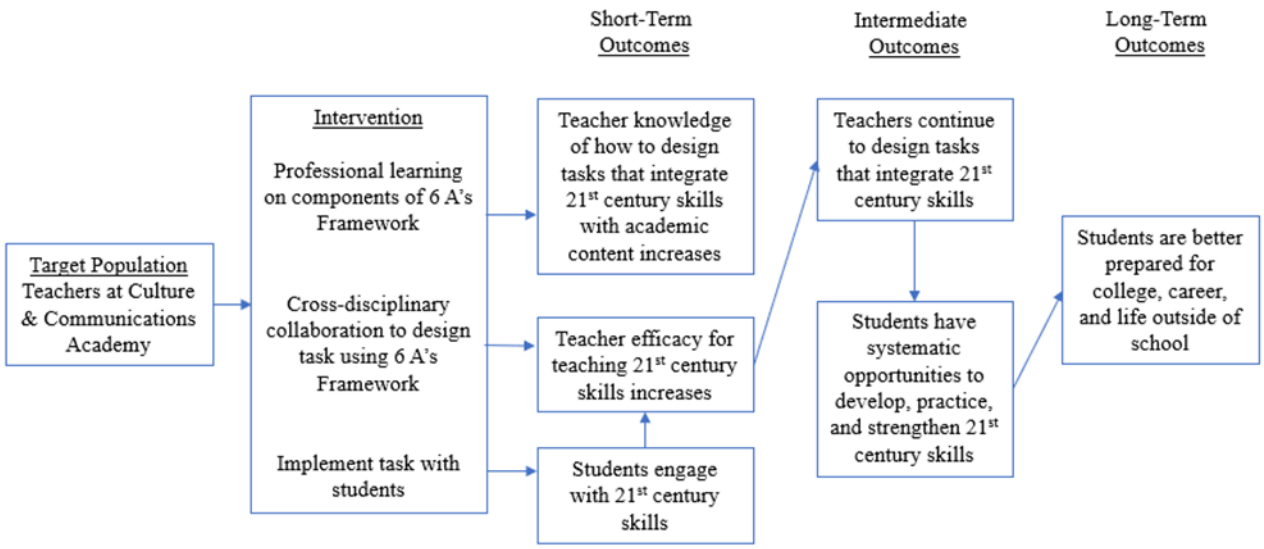
Quantitative Survey and Task Analysis Data

Subskills	Teachers who believe skill is essential (mean survey score; maximum=4.0)	Teachers who believe they currently teach this skill (mean survey score; maximum=4.0)	Teachers' actual integration of skill (mean task analysis score; maximum=4.0)	Teachers' sense of confidence in teaching skill (mean survey score; maximum=4.0)
CREATIVITY & INNOVATION				
Think creatively	4.0	3.33	1.9	3.33
Work creatively with others	3.83	3.5	1.6	3.83
CRITICAL THINKING & PROBLEM SOLVING				
Reason effectively	4.0	3.0	2.27	3.17
Use systems thinking	3.5	2.83	1.0	3.17
Make judgments and decisions	4.0	3.5	2.63	3.67
Solve problems	3.67	2.5	2.81	2.83
COMMUNICATION & COLLABORATION				
Communicate clearly	3.57	3.0	3.18	3.33
Collaborate with others	N/A	N/A	2.45	N/A
FLEXIBILITY & ADAPTABILITY				
Adapt to change	3.63	3.5	1.36	3.0
Be flexible	3.83	3.33	1.82	3.33
INITIATIVE & SELF-DIRECTION				
Manage goals and time	3.83	2.83	2.0	3.17
Work independently	4.0	3.33	2.55	3.5
Be self-directed learners	4.0	3.67	1.45	3.67
SOCIAL & CROSS-CULTURAL SKILLS				
Interact effectively with others	4.0	3.67	1.9	3.67
Work effectively in diverse teams	3.83	3.5	1.73	3.5
PRODUCTIVITY & ACCOUNTABILITY				
Manage projects	3.33	2.83	1.55	3.33
Produce results	3.33	3.0	2.36	3.33
LEADERSHIP & RESPONSIBILITY				
Guide and lead others	3.67	3.0	1.45	3.33
Be responsible to others	N/A	N/A	2.0	N/A
TRADITIONAL SKILLS				
Comprehend the 5W's in a text	3.5	3.33	1.72	3.67
Follow directions	3.83	3.33	2.81	3.5
Memorize concepts	2.33	2.33	1.09	2.83

Organize materials	3.6	3.25	1.36	3.5
Perform basic math operations	3.67	2.0	2.36	3.0
Produce type-written work	3.33	3.0	1.45	3.17
Study effectively	3.67	2.83	1.0	3.33
Summarize others' ideas	3.5	3.33	2.27	3.17
Take notes	3.33	2.83	2.27	3.33
Use correct grammar	3.33	3.33	1.73	3.33

Appendix E

Treatment Theory for Intervention



Appendix F

Pre-/Post-Intervention Questionnaire

Participant Code: _____

Part 1

1a. I know specific strategies that can help me integrate 21st century skills into student learning tasks.

Strongly Disagree	Disagree	Agree	Strongly Agree

1b. [If participant selects agree or strongly agree for item 1a] Give an example of a strategy that can help you integrate 21st century skills into student learning tasks and explain how it would help [open-ended]:

2. I know how to design learning tasks that exemplify the following components (check one box in each row):

Component	Strongly Disagree	Disagree	Agree	Strongly Agree
Authenticity				
Academic Rigor				
Applied Learning				
Active Exploration				
Adult Relationships				
Assessment				

3. Give an example of a task that exemplifies any component above.

4. I know how to design learning tasks that combine all of the following components: Authenticity, Academic Rigor, Applied Learning, Active Exploration, Adult Relationships, Assessment

Strongly Disagree	Disagree	Agree	Strongly Agree

5. In the past month, to what degree have the following contributed to your learning about teaching 21st century skills?

	Not at all	To a limited degree	To a moderate degree	To a significant degree
Discussion or collaboration with colleagues				
Professional texts				
Professional development workshops				
Other				

Appendix G

Collaboration Reflection Log

Date: _____ Team Work Session #: _____ Participant Code: _____

1. What did your team accomplish during this session?

2. What new learning, deeper learning, or alternative perspectives, if any, did you develop as a result of this session?

3a. Did your teammates offer examples from their own professional experience that contributed to your understanding? If so, explain.

3b. How else did your team contribute to new or deeper learning, if at all?

4a. Did your teammates offer encouragement that contributed to your sense of confidence for teaching 21st century skills? If so, explain.

4b. How else did your collaborative team contribute to your confidence in teaching 21st century skills, if at all?

5. What challenges emerged from your collaborative work this session, if any?

Appendix H

Teacher Efficacy Survey

Directions: Rate the degree to which you agree or disagree with each statement below.

Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

1. I will continually find better ways to teach 21st century skills.
2. Even if I try very hard, I do not teach 21st century skills as well as I do my subject area.
3. When students improve in 21st century skills, it is often due to their teacher having found a more effective teaching approach.
4. I know the steps necessary to teach 21st century skills effectively.
5. I am not very effective in monitoring 21st century skill activities.
6. If students are underachieving in 21st century skills, it is most likely due to ineffective 21st century skills teaching.
7. I generally teach 21st century skills ineffectively.
8. The inadequacy of a student's background in 21st century skills can be overcome by good teaching.
9. The low achievement of some students in 21st century skills cannot generally be blamed on their teachers.
10. When a low-achieving child progresses in developing 21st century skills, it is usually due to extra attention given by the teacher.
11. I understand 21st century skills well enough to be effective in teaching 21st century skills.
12. Increased effort in 21st century skills teaching produces little change in some students' 21st century skills achievement.
13. The teacher is generally responsible for the achievement of students in 21st century skills.
14. Students' achievement in 21st century skills is directly related to their teacher's effectiveness in 21st century skills teaching.
15. If parents comment that their child is showing more interest in 21st century skills at school, it is probably due to the performance of the child's teacher.
16. I am typically able to answer students' questions about 21st century skills.
17. I wonder if I have the necessary skills to teach 21st century skills.
18. Given a choice, I would not invite the principal to evaluate my 21st century skills teaching.
19. When a student has difficulty understanding 21st century skills, I am usually at a loss as to how to help the student understand it better.
20. When teaching 21st century skills, I usually welcome student questions.
21. I do not know what to do to turn students on to 21st century skills.

Directions: Respond to the open-ended questions below.

1. What obstacles or challenges, if any, currently limit your ability to teach 21st century skills? Explain how these obstacles or challenges impact your instructional practice in relation to 21st century skills.

2. What knowledge, skills, or resources could help you teach 21st century skills more effectively at this time?

Appendix I

Focus Group Protocol

1. Describe your experience designing a task using the 6 A's Framework. To what extent do you think you designed a good task?

2. Describe your experience implementing a 6 A's task with students.

    - How did students respond to this task in comparison to other tasks you have implemented this year? Were they more or less motivated than usual?

    - What did students learn as a result of the task you designed? How do you know? Is this like or unlike what they would have learned if you had used your previous task framework?

    - Were all students successful in meeting instructional objectives while using this framework? Why or why not?

3. How, if at all, did working with an interdisciplinary team to design and implement the task shape your experience or outcomes?

4. How, if it all, did the 6 A's Framework help you…

    - integrate academic content with 21st century skills?

    - practice authentic pedagogies?

    - engage and motivate students to take ownership for their learning?

    - minimize behavioral disruptions

5. What challenges arose while using the task framework in the design or implementation stages, and how did you address these?

6. Do you feel more confident integrating 21st century skills using this framework? Why or why not?

7. What would help you feel more confident as you continue to work toward integrating 21st century skills into student learning tasks?

Appendix J

Semi-Structured Interview Protocol

1. Describe your experience learning about the 6 A's Framework.

2. What did you like about the framework and the professional learning process? What would you recommend changing?

3. How, if at all, did discussing components of the framework with your colleagues contribute to your thinking about using the framework?

4. How, if it all, could the 6 A's Framework help you…
   - integrate academic content with 21st century skills?
   - engage and motivate students to take ownership for their learning?
   - minimize behavioral disruptions

5. To what extent could you use the 6 A's Framework to design an effective task? What might be an example of such a task?

6. Would you feel more confident integrating 21st century skills into your classroom using this framework? Why or why not?

7. What would help you feel more confident as you continue to work toward integrating 21st century skills into student learning tasks?

Appendix K

Professional Learning Session Log

Session 1

Date: Session Focus:

Were all session activities implemented as planned? Yes No

If no:

a. What changes were made?

b. Why were these changes made?

c. How will these changes impact the plan(s) for the next session(s), if at all?

Session 2

Date: Session Focus:

Were all session activities implemented as planned? Yes No

If no:

a. What changes were made?

b. Why were these changes made?

c. How will these changes impact the plan(s) for the next session(s), if at all?

Session 3

Date: Session Focus:

Were all session activities implemented as planned? Yes No

If no:

a. What changes were made?

b. Why were these changes made?

c. How will these changes impact the plan(s) for the next session(s), if at all?

Session 4

Date: Session Focus:

Were all session activities implemented as planned? Yes No

If no:

a. What changes were made?

b. Why were these changes made?

c. How will these changes impact the plan(s) for the next session(s), if at all?

Session 5

Date: Session Focus:

Were all session activities implemented as planned? Yes No

If no:

a. What changes were made?

b. Why were these changes made?

c. How will these changes impact the plan(s) for the next session(s), if at all?

Appendix L

Task Feedback Tool

Component	Reflected in Task (Y/N)	Evidence	Feedback
Authenticity			
Academic Rigor			
Applied Learning			
Active Exploration			
Adult Connections			
Assessment			

Appendix M

Task Implementation Documentation Form

1. Did you implement your task as designed?

2a. If yes, what facilitated this implementation?

2b. If no, what impeded this implementation?

3. Before implementing the task, how did you anticipate students would respond to the task?

4. Describe how you introduced this task to students.

5. How did students respond when you first introduced the task? Did their responses change as the task progressed?

6. Did anything significant happen when you implemented this task? Responses could include student reactions, planning considerations, implementation challenges, etc.

7. What were the outcomes of the task? Did students achieve the anticipated outcomes?

8. If you were to implement this task again, what change(s) might you make? Why?

9. Would you like to share anything else about the process of implementing this task or the task outcomes?

Appendix N

Outcome and Process Evaluation Data Collection Summary Matrix

Outcome Evaluation Question	**Construct**	**Data Source(s)**	**Data Collection Tool**	**Frequency**	**Data Analysis**
To what extent did professional learning on the 6A's Framework increase teachers' knowledge, if at all, of how to teach 21st century skills?	Teacher knowledge of task design components that support 21st century learning	Teachers	Questionnaire with 5 closed- and open-ended questions.	Researcher will administer once before and once after professional learning sessions	Descriptive statistics and thematic content analysis
To what extent did teachers' professional learning on the 6A's Framework increase teachers' efficacy, if at all, for teaching 21st century skills?	Teacher efficacy for teaching 21st century skills	Teachers	Interview protocol with questions informed by Teacher Sense of Efficacy Scale (Tschannen-Moran & Woolfolk Hoy, 2001)	Researcher will conduct once following professional learning sessions	Thematic content analysis using a pirori codes and emergent codes
			Survey with 21 closed-ended questions adapted from Science Teachers' Efficacy Belief Instrument (Enochs & Riggs, 1990).	Researcher will administer once before professional learning sessions and once after sessions	Descriptive statistics
To what extent did teachers' collaboration in a community of practice impact their teaching efficacy?	Teacher collaboration in a community of practice	Teachers	Interview protocol with questions informed by Teacher Sense of Efficacy Scale (Tschannen-Moran & Woolfolk Hoy, 2001)	Researcher will conduct once following professional learning sessions	Thematic content analysis using a pirori codes and emergent codes

Process Evaluation Question	Process Evaluation Indicator(s)	Data Source(s)	Data Collection Tool	Frequency	Data Analysis
Were planned professional learning activities implemented as designed?	Percentage of planned sessions implemented as designed	Researcher	Professional learning session log	Researcher will complete reflection log after each professional learning session	Numerical calculation of number of sessions implemented as designed; thematic analysis of reasons for deviation from plan, if any.
Did new student learning tasks reflect components of the 6 A's Framework? [Not implemented]	Percentage of tasks that reflect 4 of 6 components of 6 A's Framework	Teachers	Task feedback tool	Assessed once after task is complete and before task is implemented	Numerical calculation of percentage of tasks that reflect 4 of 6 components of 6 A's Framework
Were new student learning tasks implemented as designed? [Not implemented]	Percentage of tasks implemented as designed	Teachers	Implementation survey	Teachers will complete survey after implementing task	Numerical calculation of number of tasks implemented as designed; thematic analysis of reasons for deviation, if any.

Note: Items shaded in gray were not implemented as part of the amended study design.

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